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THE NORTH AMERICAN TRUCK
MANUFACTURING INDUSTRY

by

MARK M. LAINE

THESIS

Submitted in partial fulfilment of the
requirements for the Master of Arts Degree
Wilfrid Laurier University

1979

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The North American Truck
Manufacturing Industry

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ABSTRACT

Although the truck industry has usually been included in studies on the motor vehicle industry it has enough special features to study it separately. The industry initially concentrated in the Northeastern region of the United States. It was prevented from expanding by the limitations of the truck type of the time. As the truck type improved the industry was freed from locating only in the major cities. With the automobile and the gasoline engine industry in the Midwest, the truck industry soon shifted there. With greater acceptance of the truck and ease of entry into the industry, truck companies dispersed to all areas of North America. This lasted until the large company became dominant and the small firms were forced out of the industry, resulting in a contraction of the industry's spatial pattern. More recent changes have been the expansion of Western firms to the East, almost duplicating the earlier expansions of the Eastern companies.

Acknowledgments

A project such as a Masters Thesis is one which is rarely accomplished by one person. Throughout the research and writing many others devoted some of their time, knowledge and encouragement. With this in mind I must acknowledge the contributions of others to this thesis. I thank Dr. Alfred Hecht, my advisor, for his guidance, assistance and patience, especially when my progress slowing down. Also I greatly appreciate the assistance of Dr. Grant Head, who helped me finish the thesis. In addition I thank Dr. G.T. Bloomfield from the University of Guelph who served as an expert reader. Since this thesis had many maps and diagrams I have to mention that Pam Coutts the cartographer assisted in their preparation. I also thank the many truck companies and other sources that provided information. Finally I thank the whole thesis committee for their efforts at the successful thesis defense.

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CHAPTER ONE

Introduction

One of the largest and most influential industries is the production of motor vehicles. This industry is dominated by the producers of automobiles but a very important sector is the manufacture of trucks. Although trucks are an extremely vital part of the economy's transportation system, very little has been written about the industry that produces them. The truck industry has usually been included in studies of the automobile or the motor vehicle industry in general and little attention has been paid to its special spatial patterns or location factors.

It is then the purpose of this study to examine the truck industry in considerable detail and to attempt an explanation as to why the spatial patterns changed through time. Emphasis will be placed on the role played by the truck itself in influencing the spatial pattern of the industry. Such factors as the changes in technology will be examined to determine what effect they had on truck design and methods of production, and ultimately, the locations of the companies. It is a study not only on where the industry located, but also, when, how, and why.

The study will be concerned with the truck industry in North America, although the emphasis will be on the United States. The industry in Canada has always been only a very minor one with few important spatial changes through time, especially when compared to the United States. Both large and small trucks are included because for the early years it would have been extremely difficult to differentiate between the two in terms of production figures, location, etc.

The time period covered extends from the very beginnings of the industry in 1898 to the present day situation in 1977, the latest year for which figures are readily available.

Most of the study will be concerned with the truck industry specifically but mention will be made at numerous times of the effects of other industries such as the passenger car companies, engine producers, and the machine tool industry. In addition the roles of various events such as the wars and depressions will also be examined as they relate to the development of the truck industry.

Outline and Methodology

The first step will be to give the reader some background information on trucks and the structure of the present day truck industry. This is necessary because there seems to be little public knowledge about trucks, and the reader should have some idea of what the truck industry produces, and who these producers are.

This first section will also examine some of the location factors affecting the present day industry and compare them with some of the classical location theories. Emphasis will be placed on the fact that the truck industry deviates considerably in many cases from what might be expected if certain location theories were followed.

The next step will be to examine the industry in an historical perspective, since much of what exists in the present day is the result of past patterns and decision making. The historical chapters which follow will be divided according to periods in the truck industry when there were significant changes in the structure and spatial pattern of truck companies. Since the proof for this was not published anywhere some intensive research had to be done.

.

Using a variety of sources, which will be discussed later, it was determined that there have been over one thousand truck companies which have produced at least one truck and have been in operation at least one year. Using this information, maps were made for each year from 1900 to 1977, showing the truck companies in operation. These were then used as the basis for description and explanation of the spatial changes that have occurred in the industry.

The same information was also used to produce various graphs of the entries and exits of companies from 1900 to 1977. They often illustrated quite effectively the response of the industry to economic, technological and social changes.

The final section will be a summary of the development of the industry. It will discuss the effects of various barriers and forms of resistance on the spatial patterns which developed in the industry.

Since the study is quite detailed and extensive it required a considerable amount of research and a great array of sources was used. It is therefore necessary to examine some of these sources in greater detail.

A Bibliographic Review

When research for this study began it at first appeared as if there was practically nothing written on the truck industry. A great assortment of books, articles, and theses on the automobile industry were found on the shelves of many libraries. Trucks, and more specifically the truck industry, seemed to have been forgotten. Dozens of theses in geography, economics, and history, have dealt with many aspects of the automobile industry, but none have made more than a passing reference to trucks or commercial vehicles.

Eventually as the research became more extensive, it was discovered that the truck had not been completely ignored. Many of the books and articles written on the automobile industry also included some information on trucks. In addition, many of the factors affecting the auto industry were also influential in the manufacture of trucks.

This lack of research on the truck industry was not really unexpected since it had to compete for scholar's attention with the huge and powerful automobile industry. With its interesting history, and colorful characters, it is not surprising that so much has been written about it. Its impact on the economy could not be ignored.

Trucks, and the industry that produces them, have usually been either included in the broad term, the motor vehicle industry, or they have been classified as industrial machinery and omitted from auto industry studies. In many cases the truck and car industries are very similar, especially the small trucks which are very much like passenger cars in terms of weight, size, etc. It is the larger trucks that are the most distinctive and should be studied separately.

This study which attempts to examine the truck industry in some detail was faced with a lack of published material dealing specifically with trucks. As a result, a wide range of sources had to be used. To give the reader a better idea of what sources were used and what each of them contributed, it is necessary to briefly review some of the more important ones. They can be roughly divided into three groups; statistical sources, those dealing with the motor vehicle industry, and industrial location studies. In combination, they were sufficient to provide most of the information needed for this study.

Statistical Sources

The statistical sources were used to provide such information as yearly production figures for the various manufacturers, locations of assembly plants, and registrations by state or province.

Two of the most easily available ones were trade journals for the motor vehicle industry. The most useful was Ward's Automotive Yearbook, an annual statistical summary of the industry's production and registration statistics.¹ Although the earliest published volume available was 1936, it, as well as the others, provided some less detailed data as far back as 1900. Complementing Ward's was another trade journal, The Automotive News, which provided similar information although in a slightly different format.²

The other sources of statistics were really the sources used by the trade journals. For production figures, the Motor Vehicle Manufacturers Association was an excellent source.³ It provided various statistical reports on factory sales of trucks of all kinds in North America. Its main problems were that it reported only some companies, and there were no geographical breakdowns of the figures.

For registration figures the best source was the R.L. Polk Company which collects all the registration figures for trucks and cars sold in North America.⁴ The breakdown of

figures was very detailed and thus it was indispensable as a source for showing geographical trends. There were also some problems with this source as some areas did not report their registrations in some years. It was however the only such source and even the motor vehicle companies use it quite extensively for marketing. The information also has to be purchased from Polk although the older figures were easily available in such sources as Ward's and Automotive News.

In addition to these motor vehicle oriented sources the various statistical services of the Canadian and American governments provided such information as population statistics.⁵ In some cases they were also valuable as sources for the very old production figures on motor vehicles, use of such vehicles ,and the impact they had on the economy. Some even provided some of the early prices for cars and trucks. Much of the information such as this would have been extremely difficult to obtain from other sources.

Although the various statistical sources provided great amounts of very useful information, there still was the need for knowing the number of companies, their locations, years of operation, etc. This would have been a great obstacle had it not been solved by a published listing of all the truck companies that were ever in operation in North America. It provided their years of operation, locations and names, from 1898 to 1971. This was the section on trucks in an Automobile Quarterly publication, "The American Car".⁶ Supported by an excellent chapter on the history of trucks in America by Montville, this book provided great amounts of excellent information.⁷ These companies, which numbered over one thousand were all mapped for every year from 1898 to produce most of the maps and text for this study. This source was complemented by a directory by Georgano on the "World's Commercial Vehicles."⁸

To add to these sources, the various truck companies were sent numerous letters asking for information on their sales, history, facilities, etc.⁹ In most cases they replied and supplied information that really could not have been obtained from any other sources. Such items as advertising brochures, company histories, and annual reports were the most useful.

The Motor Vehicle Industry Sources

The next group of sources was one which included studies on the motor vehicle, the industry, and industries closely related to it. They ranged from articles written in the early years of the industry to ones which dealt with the present day structure of both the automobile and truck manufacturing industries.

Of all these sources, by far the best was Montville's story of Mack Trucks.¹⁰ Although it was not really geographic or even economic, it was still an excellent study of the growth of a typical truck company. Montville, being a noted truck historian also has written other articles on the truck industry and trucks in general.

Another purely truck oriented source was a pictorial history of trucking before 1920, by Karolovitz.¹¹ Although it had mostly pictures, there was some valuable information in the text on the types of truck in the early years of the industry. It helped give a better idea of what the trucks were like in those days and it showed many of the problems that were encountered with the early trucks, especially in competition with the horse.

On the industry itself there was a variety of very interesting and informative studies. Many were written in the periods of great expansion in the industry and thus reflect the views of the day.

A popular topic in the early literature was comparison between the horse and the truck. An early article by Rogers which appeared in the Scientific American of 1909, discussed the merits of the horse versus various types of trucks.¹² A similar study was done by Casson, Hutchinson and Ellis, in 1913, which examined the role of the truck and the tractor in industry and agriculture.¹³

Some other studies were done on the industry in general. Of these the best, without question, was Doolittle's large and comprehensive book entitled, "The Romance of the Automobile Industry."¹⁴ It was published in 1916 and gives a very informative view of not only the truck industry, but also the automobile, parts and supply industry. A later book on the automobile industry was by Epstein in 1928.¹⁵ He did not deal specifically with trucks but he did examine the automobile industry in great detail and seems to be the only one who dealt with the hectic activity of entries and exits in the industry in the early years. The book also contains in its appendix some very difficult to obtain statistics on sales and production up to 1928.

These early sources, however comprehensive they were, did not always provide reasons as to why the industry developed in the way that it did. To find answers to these questions it was necessary to examine studies dealing with the adoption and impact of the motor vehicle.

This topic was treated very well by Flink in his study of the adoption of the motor vehicle in America.¹⁶ He applied a number of variables to new truck registrations by state and showed how the Northeastern United States became the area of initial concentration of motor vehicle usage. A similar study was done by Wiks when he examined the role that the motor vehicle, especially the Ford Model T, played in increasing the mobility of the American farmer.¹⁷

As the truck industry expanded, it was affected by some other, often closely related industries. Wagoner's study of the machine tool industry illustrates the various inter-relationships between the motor vehicle and tool industry.¹⁸ Rosenberg also studied the machine tool industry and showed how technological change caused locational shifts in the industry.¹⁹

This theme of locational change has been used quite often, as many researchers examined and attempted to explain the relative decline of the industry in the Northeastern states. A study such as that done by Fabricant on the state of the manufacturing industry gives some interesting information on the early truck industry.²⁰ Barger in his study on transportation industries deals specifically with trucks in one section and even gives some old prices and production figures for the very early years.²¹

Much of the literature on the truck industry was published in the years of greatest expansion of the industry, between 1910 and 1929. After the 1930's there was little material being published on the truck or automobile industry. It was not until the 1950's that there was any renewed interest in the industry. Many of the articles and books written in the 1950's and later dealt with more than just the historical aspects of the industry. Instead of just describing the industry they examined the spatial patterns and attempted to explain what happened and why. It was only in this period that articles on the geography of the industry began to appear.

One of the first industrial location studies on the motor vehicle industry was one by Hurley in 1959.²² Although it dealt almost exclusively with the automobile industry it did examine many of the location factors which were common to both car and truck sectors. Hurley also points out the importance of "happenstance" factors in influencing the locations of truck companies. Another 1950's period study was one done by Boas on the locational patterns of American automobile assembly plants.²³ Again the study is almost exclusively about the automobile and one has to read it carefully to find anything that applies to the truck industry. Its comparisons of the changing importance of the major cities was one which could be compared to a situation in the truck industry.

Another geographical study was done by Birch in 1966, in which he examined the roles played by various industrial location factors on the automobile industry.²⁴

Of these more modern studies, the best was the work done by Rhys on the commercial vehicle industry.²⁵ Although most of his work dealt with the British industry it had much relevance in a North American context as well. Much of it dealt with the way in which the small independent firms are able to survive in a world of big business.

Although most of the literature deals with the American industry there have been a few that examine the Canadian motor vehicle industry. Most were of little use in this study since they provided little more than simple stories. One which was useful was an MA Thesis by Byrnes on the automobile industry in Ontario up to about 1950.²⁶ It examined the roles played by tariffs and trade barriers in encouraging the growth of the Canadian industry. Another Canadian source, and probably the best, was Cars of Canada, a large book on the motor vehicle industry in Canada, by Baechlor and Durnford.²⁷ It, as well as many of the others, did not provide much geographical information but it did illustrate some of the changes in the industry such as production methods, and the vehicles themselves. To apply all of this to a geographical study required other types of sources.

Industrial Location Sources A number of well known sources were used as reference such as Hoover's, Locations of Economic Activity.²⁸ Although it was rather dated it remains one of the best general sources on industrial location.

Use was also made of other general books as the industrial location works by Riley²⁹ and Estall and Buchanan.³⁰ Both had interesting sections on the motor vehicle industry as well as general sections on industrial location factors. A similar textbook style source was one by Thoman et.al., which had a well illustrated although rather confusing section on the inter-relationships in the motor vehicle industry.³¹

More theoretically oriented sources, which were not specifically about the motor vehicle industry were also used to some degree. A good example was the study done by Smith on the spatial margin of profitability in industrial location decisions.³² He illustrated the concept that firms do not always have to seek the point of lowest cost or highest profit, and that they can usually succeed as long as they locate within certain economically sound areas.

Of all these industrial location sources, probably the most used was, Models in Geography, edited by Chorley and Haggett.³³ It contained many articles on geography with the most useful one being the one on models of industrial location by Hamilton.³⁴

Besides industrial location studies, some sources on the diffusion of innovations were also used, although they were not always applicable to the truck industry. Hudson's study on diffusion as waves across the land was one such example.³⁵ Another was the classic diffusion study on farm subsidies in Sweden by Hagerstrand.³⁶ Its importance was in defining the various types of diffusion, such as relocation and expansion. Haggett in his Geography , a Modern Synthesis, also examined the different types of diffusion and how they occur.³⁷

A comparison of different types of diffusion in a variety of industries was the topic of Ray's study.³⁸ He examined nine industries and illustrated how new technology diffused and what effect it had on the location of the various industries. A similar study was done by Thomas and LeHeron on the way changes in technology diffuse in the manufacturing industry.³⁹

This brief review of some of the most important sources used in this study hopefully gives the reader some idea of the range of material that had to be covered in the reasearch for this study. Since few sources dealt specifically with the truck industry, the necessary information had to be gathered from many different sources

Footnotes to Chapter One

1. Ward's Automotive Yearbook, Ward's Publishing Co.,
Detroit, Michigan, 1936-1977.

This is an annual book published by Ward's which is an automotive trade journal. It not only provides statistics, but also short histories on the companies, trends in the industry and new products and accessories.

2. Automotive News Almanac, Automotive News Publications, Detroit, Michigan, 1970-1977.

Similar to Ward's this also has a combination of text and statistics.

3. Motor Vehicle Manufacturers Association, Facts and Figures, MVMA, Detroit, Michigan, 1975, 1977.

This is a yearly publication issued by the MVMA summarizing the size and impact of the industry. The MVMA also publishes a report for its member companies on factory sales of motor vehicles.

4. R.L. Polk is a company which buys registration figures from the governments and then resells them to interested users such as truck companies. They are able to breakdown registrations down to the actual name and address of the person or company to whom the vehicle was registered to.

5. Statistics Canada and the Statistical Abstract of the United States were two of the better government sources. In the case of the American one, information was available in considerable detail as far back as the 1890's.

6. The American Car Since 1760, ~~Automobile Quarterly~~ Publications, New York, 1971.

This is probably the most comprehensive book on the history of the motor vehicle industry, and it is one of the few that has a significant amount of material on trucks and truck companies.

7. Montville J., "A History of American Motor Trucks", in The American Car, op.cit.,

Montville is probably the most well known historian with an interest in the truck industry. He has numerous other books and articles on trucks.

8. Georgano G.N., The World's Commercial Vehicles, Temple Press, London, 1965

This book includes all truck producing countries but it is not nearly as good as the listing in, The American Car,

9. Every truck company in North America was sent at least one letter and about 90% of them replied. The notable exception was White, which never replied to any letter.

10. Montville J.B., Mack, Haessner Publications,
Newfoundland, New Jersey, 1973

This was by far the best source on a single truck company. It illustrates very clearly the growth of a typical heavy duty truck company.

11. Karolovitz R.L., This Was Trucking, Superior Publishing Co., Seattle, 1966

Most of this book was devoted to pictures of trucks before 1920.

12. Rogers B., "The Commercial Truck Versus the Horse",
Scientific American, Jan. 16, 1909, pg. 42

13. Casson H.N., Hutchinson R.W., and Ellis L.W., Horse, Truck and Tractor, F.G. Browne & Co., Chicago, 1913

The date of this book is its most important feature. It provides an appraisal of the situation in 1913 rather than being a much newer study which would have the advantage of hindsight.

14. Doolittle J.R. ed., The Romance of the Automobile Industry, Klebold Press, New York, 1916.

No study on the historical aspects of the North American motor vehicle industry would be complete without this book in its bibliography.

15. Epstein R.C., The Automobile Industry, A.W.Shaw Co., New York,1928.
16. Flink J.J. America Adopts the Automobile, M.I.T., Press Cambridge,Massachusetts,1970.

This is an excellent study on the diffusion of the motor vehicle in the United States. A similar study should be done on truck adoption.

17. Wik R.M., Henry Ford and Grass Roots America, University of Michigan Press,Ann Arbour,1972
18. Wagoner H.D., The U.S.Machine Tool Industry from 1900 to 1950, M.I.T. Press,Cambridge,Massachusetts,1966
19. Rosenberg N., Technological Change in the Machine Tool Industry, Journal of Economic History, Vol.23,1966, pp.414-443.

The importance of the machine tool industry was that it depended very heavily on the motor vehicle industry for markets,and thus their location patterns were ones which allowed for much exchange of not only trade but ideas as well.

20. Fabricant S., The Output of Manufacturing Industries, 1899-1937, National Bureau of Economic Research, New York,1940.

21. Barger H., The Transportation Industries, 1889-1946,
Arno Press, New York, 1975 (reprinted from 1951)
22. Hurley N.P., The Automobile Industry; A Study in
Industrial Location, Land Economics, Feb. 1959, pp. 1-14
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Industry Plants, Economic Geography, April, 1961, pg. 218
24. Birch B.P., Locational Trends in the American Automobile
Industry, Geography, Nov, 1966, pp. 372-375
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Butterworth Co., London, 1972
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Un University of Toronto, 1951.
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Stewart Ltd., Toronto, 1973
28. Hoover E.M., The Location of Economic Activity, McGraw-Hill,
New York, 1948
29. Riley R.C., Industrial Geography, Chatto and Windus,
London, 1973
30. Estall R.C., and Buchanan R.D., Industrial Activity and
Economic Geography, Hutchinson Co., Ltd., London, 1973
31. Thoman R.S., The Geography of Economic Activity,
McGraw-Hill Co., New York, 1968

32. Smith D.M., A Theoretical Framework for Geographical Studies of Industrial Location,Economic Geography, April,1966.pg.95
33. Haggett P.,and Chorley R.J., eds., Models in Geography, Methuen Co.Ltd., London,1967
34. Hamilton F.E.I., "Models of Industrial Location," in Models in Geography,op.cit.,
35. Hudson J.C., Geographical Diffusion Theory, Northwestern University Studies in Geography, No.19,1972
36. Hagerstrand T., Innovation Diffusion as a Spatial Process, University of Chicago Press,1967
37. Haggett P., Geography:A Modern Synthesis, Harper and Row, New York,1972
38. Ray G., The Diffusion of New Technology: A Study of Ten Processes in Nine Industries,National Institute Economics Review , 1969,pp.40-83
39. Thomas M.D., and LeHeron R.B., Perspectives on Technological Change and the Process of Diffusion in the Manufacturing Sector, Economic Geography, 1975,pp.231-251

CHAPTER TWO

The Modern Truck Industry

Before discussing the industry and its spatial patterns, it is perhaps appropriate to define what a truck actually is. The word "truck" is neither a new word nor one which has been applied to only modern vehicles. It was originally derived from the Greek word "trokhos", meaning wheel.¹ Although through the years it has carried a number of somewhat related meanings, the word became most widely used to define commercial horse drawn wagons. Later, with the advent of the motor vehicle the word "motor" was added to "truck" to distinguish the self-propelled vehicle from the horse drawn type.²

The modern motor truck or simply, truck, is rather difficult to define because of the wide variety of vehicles included in that general classification. For the purposes of this study, the truck can be defined as a self propelled, wheeled vehicle, designed primarily for the conveyance of goods, although its application need not be purely commercial. Such a definition should be broad enough to include most of the trucks being operated on the roads today, as well as the vast majority of trucks in the past.

The very early vehicles that could be called trucks were steam powered and were usually designed primarily as tractors for industrial or agricultural use.³ In the late 1890's a number of such contraptions were developed in Europe and North America. Most of them were unreliable and very cumbersome to operate. They did provide, however, a basis for improvement and by 1915 trucks had become relatively efficient machines. Acceptance of the truck was often determined by its performance against the horse as a means of commercial transport.⁴ In many cases the truck was its own worst enemy as its unreliability and lack of flexibility made the change from horse to truck seem foolhardy.

Eventually the truck did improve mechanically and it became more widely accepted, mainly because it could be used in a wider range of environments with less loss of performance than the horse. A great period of advancements was in the 1920's when gasoline engines finally proved to be superior to steam or electric power.⁵ In addition to the engine there were other improvements such as improved chassis design and pneumatic tires which enabled trucks to carry larger loads at higher speeds.⁶ Improved production methods, more efficient trucks and better roads after the Second World War helped to make the truck industry what it is today, a large and fast growing sector of the immense motor vehicle industry.

The Modern Truck

Modern trucks are produced in a great variety of forms with many body designs, sizes, prices, and weights. To describe or classify trucks, the two most common methods used are, body type and weight class. The body type at first divides trucks into either straight trucks or tractors, trucks being those which have a load carrying body attached onto them, and tractors being those which pull semi-trailers. The type of body attached to a truck will depend on the work that the truck is to do. They range from large box like vans to dump bodies and concrete mixers. The semi trailer pulled by the tractors can also be almost anything with 40 foot long vans or flatbeds being the most common. (Fig. 1) In almost all cases the truck companies do not make the truck bodies or trailers. The main exception is in the manufacture of the small pickup trucks and vans which are almost always built completely by the truck company.

The other common classification for trucks is the use of weight classes. They give a much better idea of how large a truck is. These classes range from 1 to 8 and are based on the combined weight of the truck and the maximum load it is designed to carry. This weight is usually called G_CW (Gross Combination Weight) for tractors or GVW (Gross Vehicle Weight)

for trucks.⁷ Both are basically determined by such factors as tire size, axle strength, number, and spacing, frame thickness, and wheelbase.

These weight classes are called Group 1 for trucks under 6,000 lbs. GVW and range up to Group 8 for trucks over 33,000 lbs. GVW.⁸ (Fig.1) The maximum value of Group 8 trucks depends not only on the truck but also on the many weight regulations in the various states and provinces. The Gross Combination Weights for tractor trailers range from 78,000 lbs. on much of the United States Interstate highway system, to a high of 140,000 lbs. on most Ontario highways.⁹ In addition to weight, trucks are regulated according to length, width, height, tire size, and a host of other restrictions.

The different weight classes can be combined to divide trucks into light, medium, and heavy. Light trucks are the Group 1 and 2. Medium includes Group 3 to 7, and Group 8 is reserved for the heavy duty trucks. The light trucks are the small pickups and vans. The medium trucks are usually single rear axle delivery trucks with gasoline engines. The heavy trucks almost always have tandem rear axles, diesel engines, and very heavy duty components.¹⁰ They are also the ones which are used in the greatest range of uses and as a result they are often custom built to the purchaser's special specifications.¹¹

In North America, the automobile industry is dominated by a few large companies which collectively account for over 97% of all production.¹² This situation is due partially to the fact that virtually all automobiles are designed for one basic purpose, transportation of people. As a result, most automobiles are very similar in design and large numbers of them can be easily produced on the high speed assembly line. The ease of production has allowed the automobile companies to build large assembly plants in order to take advantage of the resulting economies of scale. These large plants have enabled a small number of companies to produce cars at lower costs than the competition and thus reduce the number of companies competing for the car market. In order to be competitive, the small company has to offer an alternative product which is desirable even though its price may be high. In most cases the large companies offer such a wide range of vehicles that there is only a small market left for the independent producers.

The passenger car is quite widely distributed throughout North America. (Map 1) Almost all states and provinces are within 25% of the national average of about 2 persons per car.¹³ The only exception is New York where the ratio of car registrations is over 3 persons per car. This is caused mainly by the lack of cars in New York City which has one of the world's best and most intensively used public transit systems.¹⁴

Table 1: Regional Variations in Truck Use

<u>Use</u>	<u>Region</u>			
	<u>Northeast</u>	<u>Midwest</u>	<u>South</u>	<u>West</u>
Personal	33.3%	30.0%	41.4%	52.6%
Agriculture	9.9%	43.2%	27.2%	12.1%
Construction	12.2%	6.5%	5.6%	9.2%
Manufacturing	3.5%	1.5%	2.6%	2.1%
Service	12.2%	5.6%	5.4%	7.6%
Wholesale	14.1%	6.8%	9.3%	8.0%
Retail				

Source: Motor Vehicle Manufacturers Association,
Facts and Figures, Detroit, Michigan, 1977

Table 2: Truck Assembly Plants, and Dealers, 1977

	Assembly Plants	Truck Dealers
United States	57	22,050
Canada	14	2,439
Total	<u>71</u>	<u>24,489</u>

Source: Motor Vehicle Manufacturers Association,
Truck Facts, Detroit; Michigan, 1974, pg. 51

The pattern for trucks is, however, quite different. Whereas almost all areas were within 25% of the national average for car registrations, truck ownership patterns are quite different. (Map 2) The most visible difference when shown on a map is the high ratio of trucks per capita in the Central Plains and Prairie areas of the United States and Canada. In these areas the many agricultural activities result in a much higher proportion of truck use since on farms, trucks are often used for personal transportation as well as work.

The areas with the lowest ratio of truck use are those in the highly urbanized Northeast and Midwest. (Map 2) There the greater number of people, especially in the suburban areas around the large cities results in a large number of automobiles, and a lower number of trucks.¹⁵

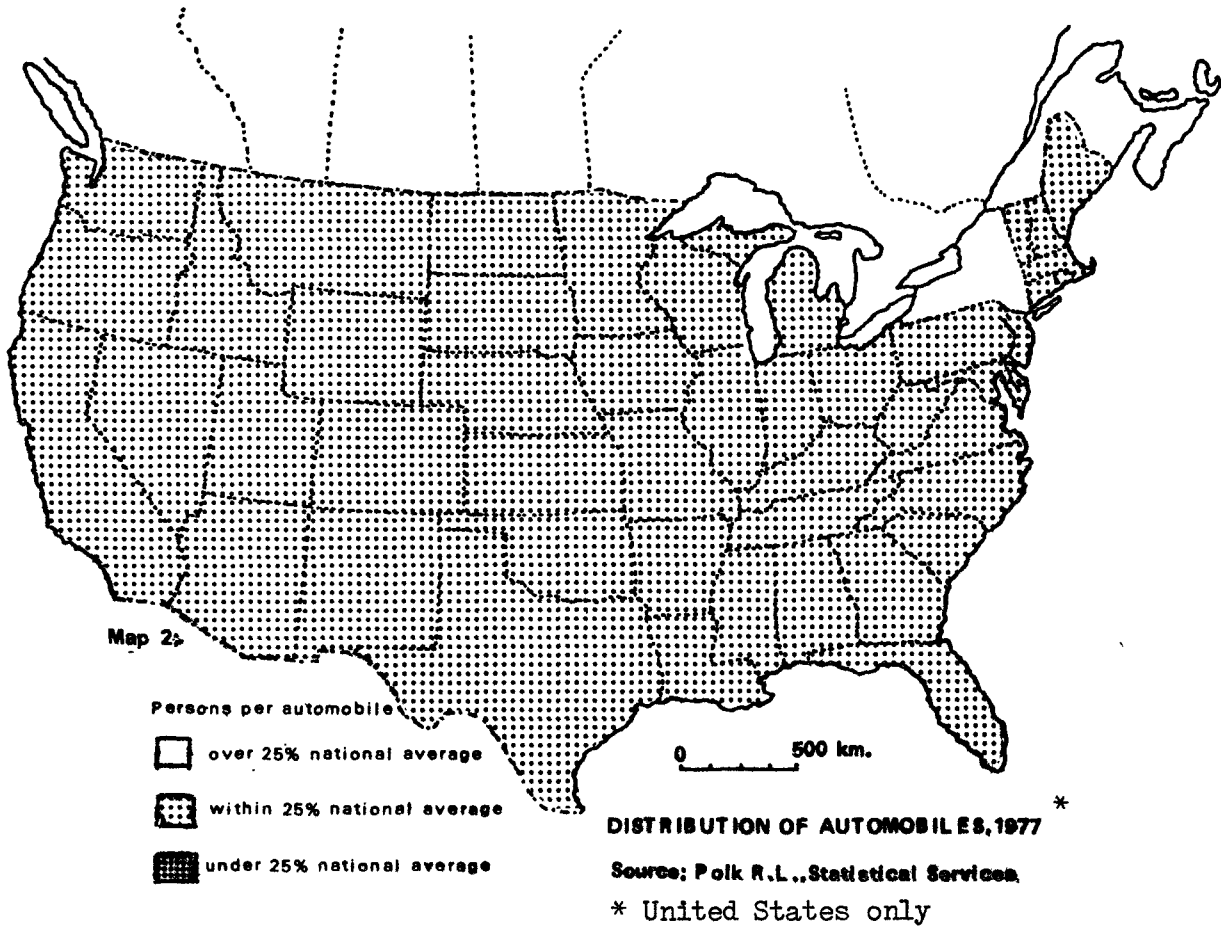
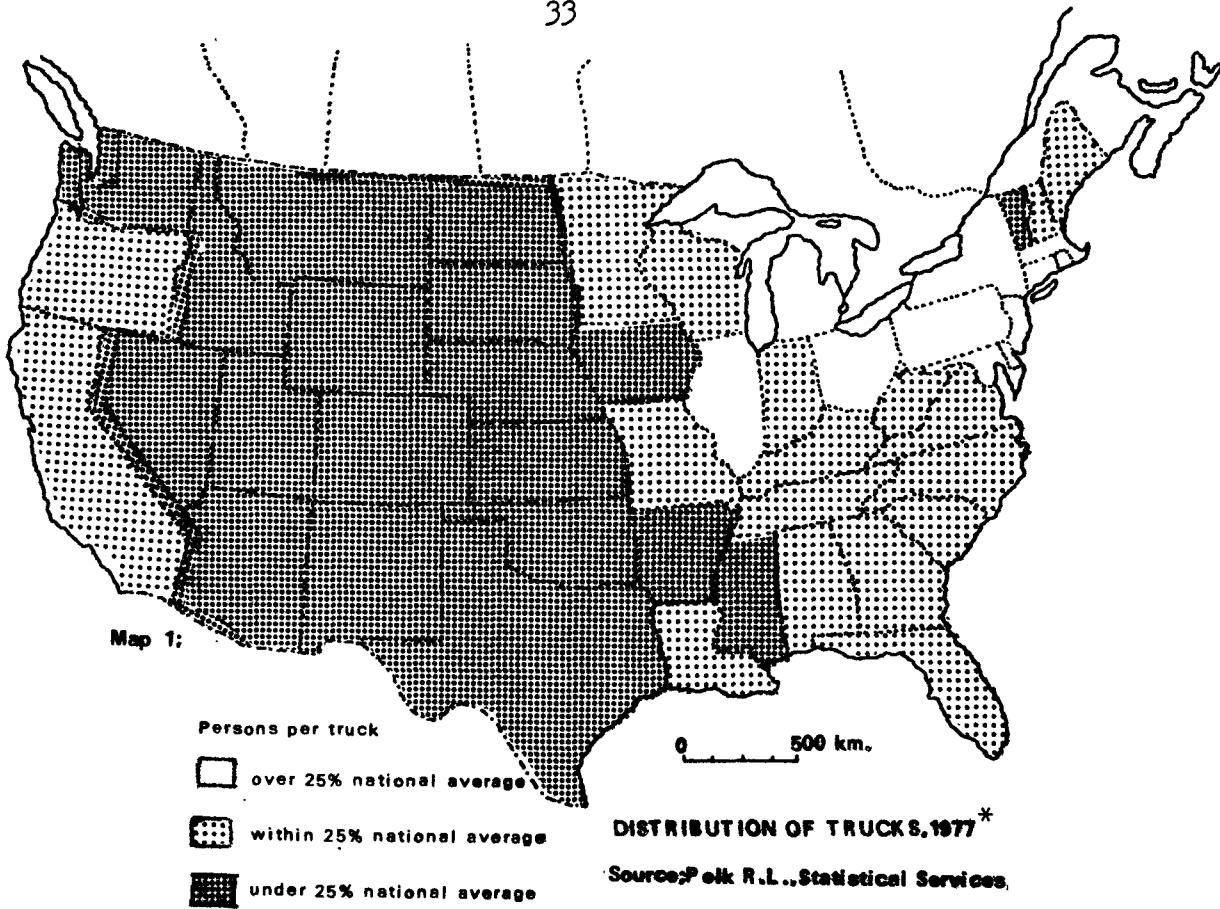
The rest of North America is within 25% of the national average of about 11 persons per truck.¹⁶ (Map 2) Areas such as the South and the West are neither very industrialized nor agricultural so they have ratios of truck use somewhere near the average. This does not, however, make them any less important because in absolute numbers they represent very large markets. In fact in some areas such as the West coast, the market is not only large, but quite different from many other areas of the country.

The Truck Industry in 1977

As was discussed earlier, the automobile industry is dominated by three large companies. They are able to satisfy the needs of the vast majority of the automobile purchasers. Only a few people have the desire or the resources to seek alternatives. As a result, the independent specialist automobile producers that do exist are very insignificant in the total North American industry in terms of volume.

Such is not the case in the truck industry, or at least in some sectors of it. For the small trucks the market and methods of production are very similar to the automobile. It is in the heavier trucks that differences occur, not only in the number of producers, but in use of the trucks themselves.

These larger trucks, mainly the Group 8, are used for a wide variety of tasks. In many cases the truck is purchased for a specific job and it must be designed to perform that task as efficiently as possible. Since there are obviously a great variety of uses for trucks it becomes apparent that trucks cannot always be mass produced for a general market. The truck buyer whose needs cannot be met by the mass producers represents a market large enough to support a number of independent producers. This has led to the situation where in 1977 there were over 30 truck companies serving the needs of the North American market.¹⁷



There are basically three types of truck producers, according to their product and size. The first of these groups has the fewest members but it accounts for most of the industry's production.(Fig. 1) The companies in this group are the automobile producers which also make trucks, such as Ford and General Motors. They have been producing trucks since near the end of the First World War.¹⁸ Most of their production is made up of light trucks but they have also diversified into making large trucks.

The second group is composed of the so called large independent . They are called independents because they are not associated with the automobile companies. These are the producers of trucks exclusively, such as Mack, White and Kenworth. In some cases they have subsidiaries which make other types of machinery such as tractors or mining equipment. These companies are also very old and are the longest surviving truck producers in North America.¹⁹

The third group is made up of a small number of small independents. These firms such as Oshkosh and FWD produce very specialized vehicles such as snow plows and fire trucks. They are able to survive in a world of big companies because of the very specialized nature of their products.

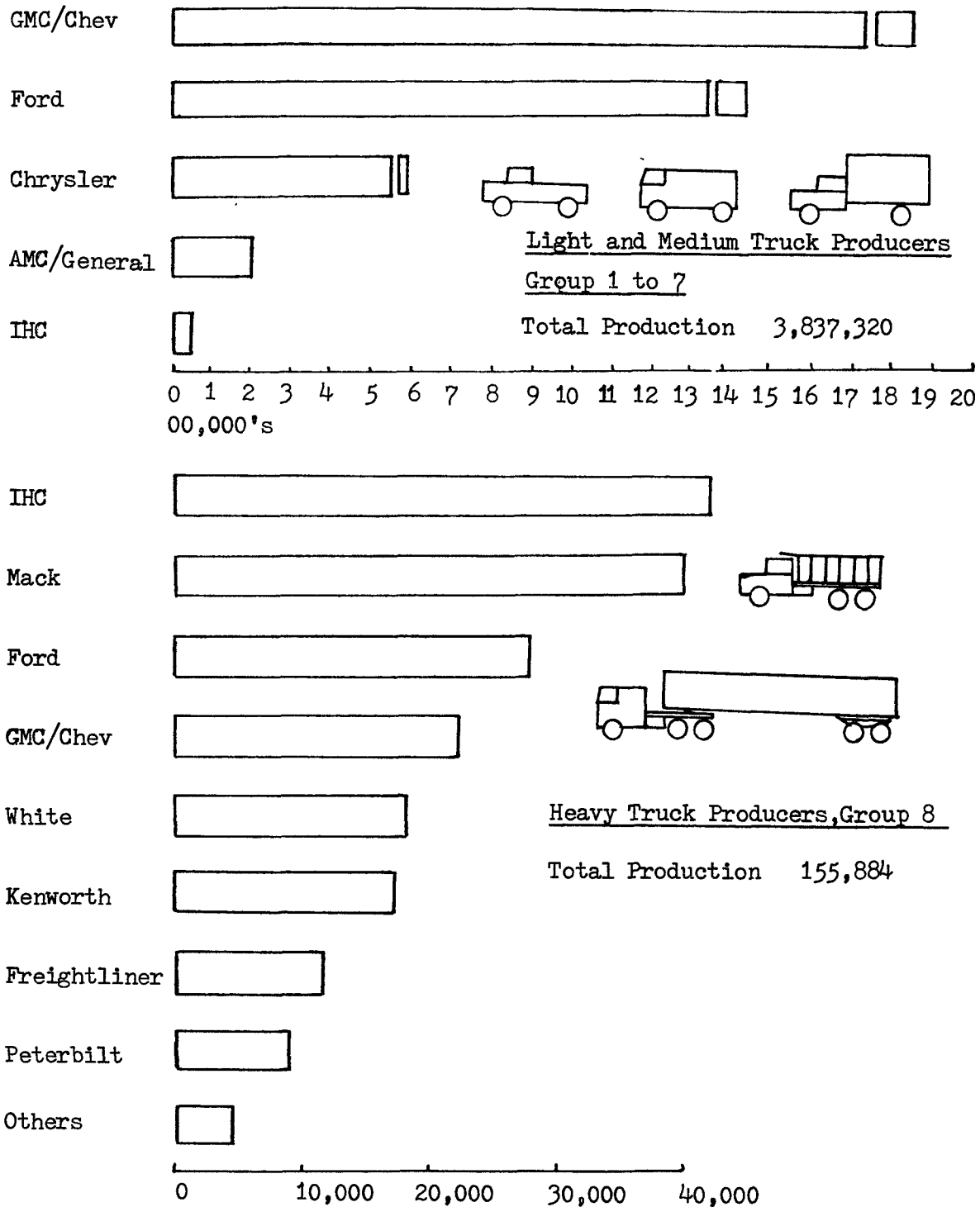


Fig. 1: Truck Companies and Production, 1977

Source: Motor Vehicle Manufacturers Association, 1978

This difference in the products of the truck and car industries has resulted in differences in production methods. In the automobile industry, the large companies with mass production facilities can produce as well and much more cheaply than could a small builder of similar cars. In the truck industry the great variety of vehicles being produced prevents any one company from gaining a disproportionate share of the market. Thus, small companies have been able to prosper by serving the needs of individual customers.

The small size of this heavy duty market has prevented the large companies from expanding their product lines. To mass produce trucks a very high capital investment is needed, and at least 80% of the plants capacity must be utilized if it is to be economical.²⁰ For the small scale producers only about 25% of capacity has to be utilized in order for them to be viable operations. In most cases the greater amount of labour required to produce the large trucks results in longer building times, and combined with the larger components causes these trucks to be priced much higher than the standard assembly line trucks. Many buyers are willing to pay a high price for their truck since often the purchase price is only 20% of the total cost of the truck in its lifetime.²¹ Buyers therefore want a truck that is reliable, efficient and as economical as possible.

These independent truck companies,as well as the truck producing divisions of the automobile companies,are in almost all cases simply assemblers rather than true manufacturers. In the small truck sector of the industry the companies build the whole truck and all the parts are the same brand as the assembled truck. As truck size increases so does the variety of component options. With a few exceptions the truck companies do not make their own diesel engines, but buy them from engine producers.²² The same is true for other major components such as axles,and transmissions.

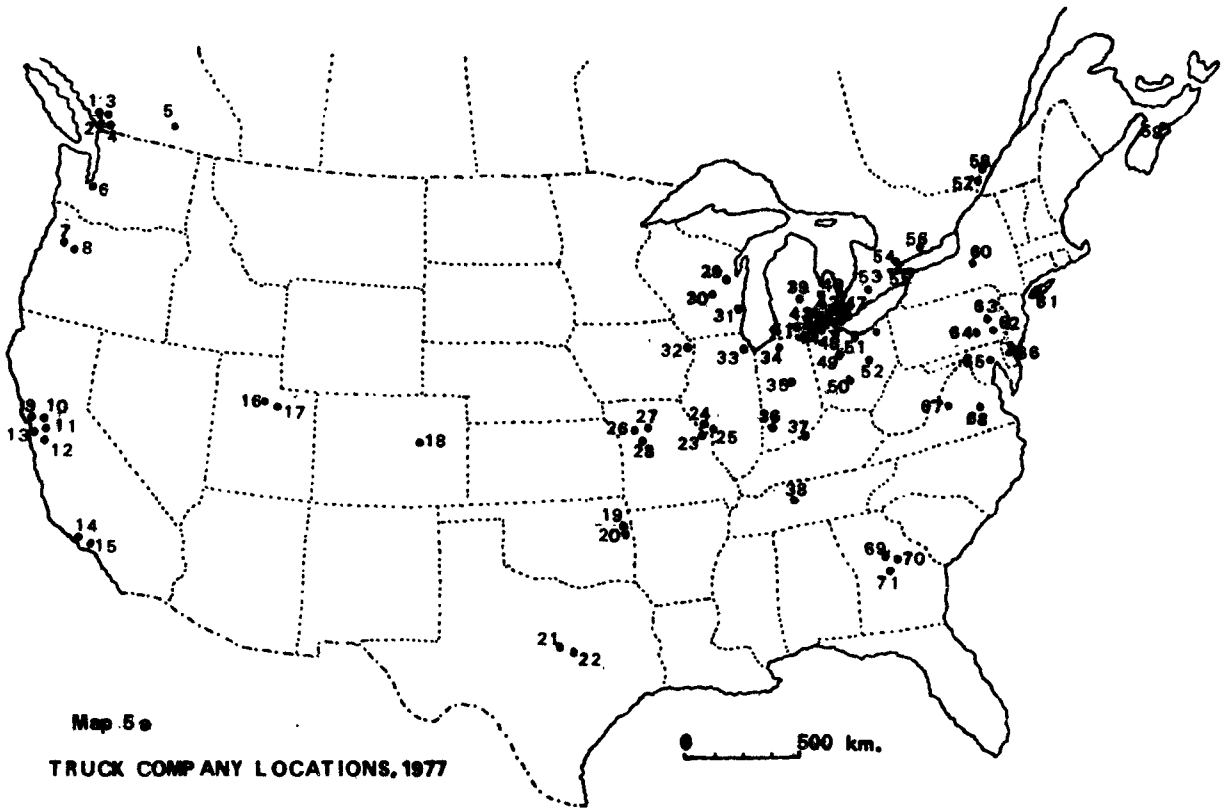
By buying these major components from outside or vendor suppliers the truck builders are saved the very high capital,research,and labour costs involved in producing such high technology products. In addition the truck companies often do not have enough individual sales volume to compete with a specialized engine manufacturer. As a result a seperate components industry has developed which supplies axles,engines,etc., to the various truck companies.²³ Since there are at least three companies producing each major component the truck buyer is able to choose from a number of combinations to build the truck best suited to his needs.²⁴

Location of the Industry in 1977

Although the truck industry has many more companies than the automobile industry its locational pattern at first appears to be very similar. A comparison of maps of the truck companies illustrates the locational patterns of the individual assembly plants to be quite similar but many of the truck plants are single companies whereas the four car producers are all in the Detroit area. (Map 3 , 4 , & 5)

It has already been discussed that the truck industry is divided into two major groups, the light trucks and the medium to heavy trucks. There are also some differences in their locational patterns and in the factors that affect these patterns. The light truck sector of the industry closely follows the pattern of the automobile industry. (Map 3)

These companies centered in the Detroit region have set up branch plants throughout the United States and Canada. Almost everywhere where there is a car assembly plant there is a light truck plant as well.²⁵ This is no coincidence since many of the light trucks use components which are used in the passenger cars as well. They are also attracted to similar markets and are sold in the same dealer outlets as the automobiles are. The large numbers of light trucks that are produced makes it economical to produce them near the major markets to reduce transport costs.



Map 5

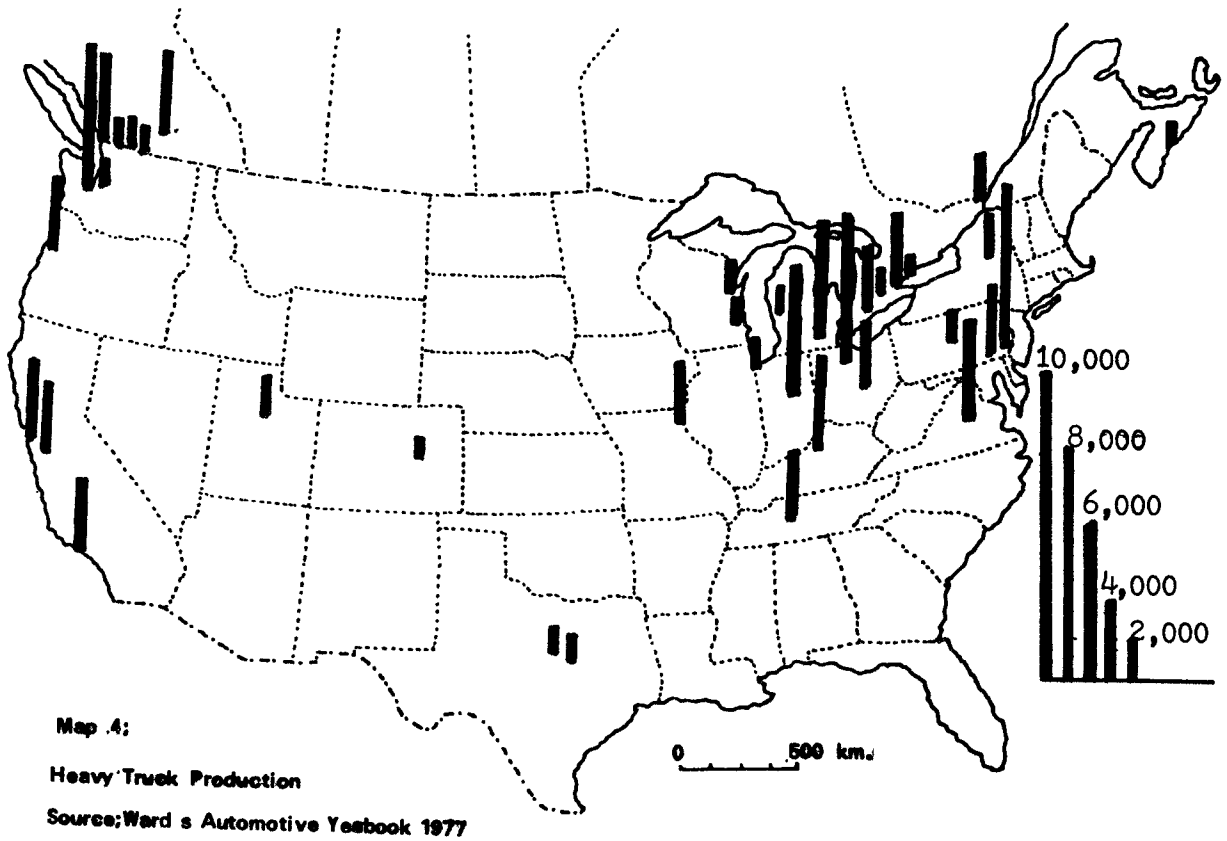
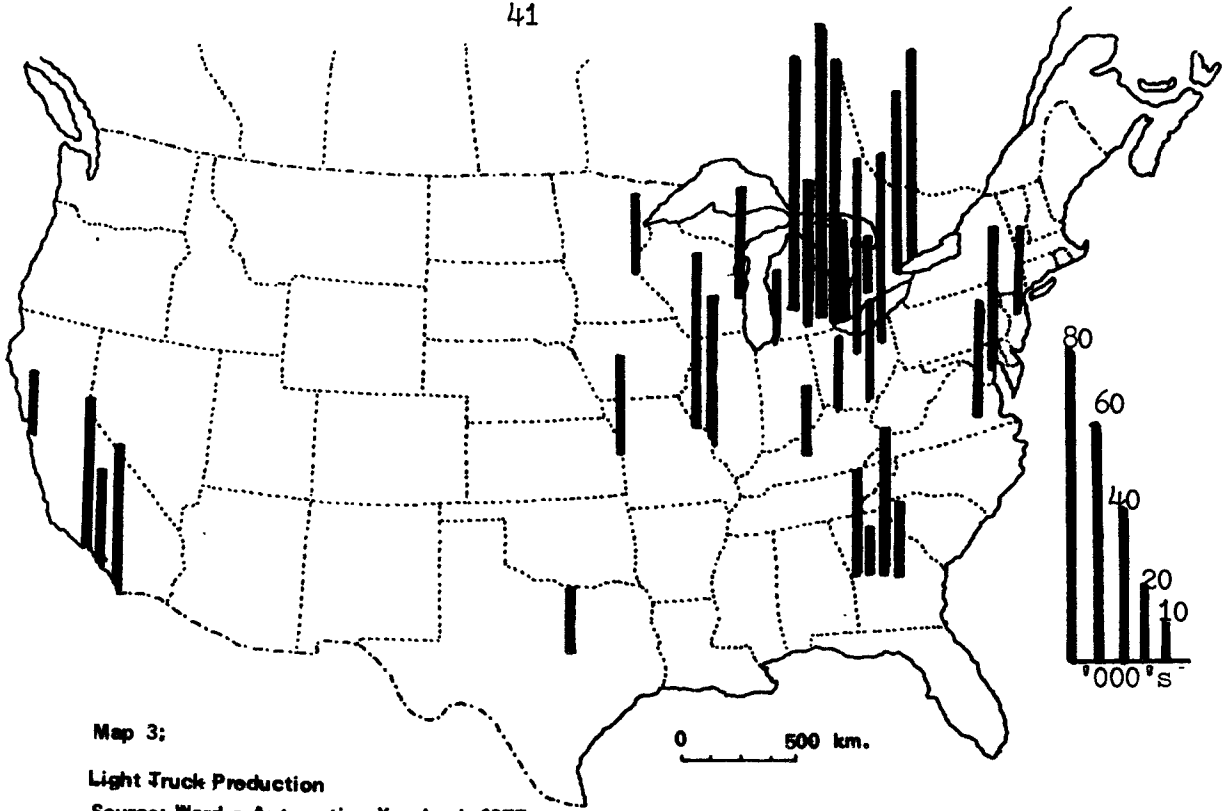
TRUCK COMPANY LOCATIONS, 1977

Source: See note to Map 5

- | | | |
|-------------------|-------------------|-------------------|
| 1. Kenworth | 21. Ford | 46. Chev-GMC |
| 2. Freightliner | 22. Chev-GMC | 47. Dodge |
| 3. Pacific | 23. Dodge | 48. Jeep |
| 4. Hino | 24. Chev-GMC | 49. Kenworth |
| 5. White | 25. GMC | 50. International |
| 6. Kenworth | 26. Kenworth | 51. White |
| 7. Freightliner | 27. Ford | 52. Ford |
| 8. Pierce | 28. Cline | 53. International |
| 9. Chev-GMC | 29. Oshkosh | 54. Mack |
| 10. Ford | 30. FWD | 55. Ford |
| 11. International | 31. Chev-GMC | 56. Chev-GMC |
| 12. Mack | 32. International | 57. Kenworth |
| 13. Freightliner | 33. International | 58. Sicard |
| 14. Peterbilt | 34. AM General | 59. Scot |
| 15. Fabco | 35. Freightliner | 60. Brockway |
| 16. Western Star | 36. Dodge | 61. Walter |
| 17. Ibex | 37. Ford | 62. Mack |
| 18. Coleman | 38. Peterbilt | 63. Mack |
| 19. Marmon | 39. Dodge | 64. Autocar |
| 20. Crane Carrier | 40. Chev-GMC | 65. Chev-GMC |
| | 41. Chev-GMC | 66. Ford |
| | 42. Chev-GMC | 67. White |
| | 43. Ford | 68. Ford |
| | 44. Hendrickson | 69. Chev-GMC |
| | 45. Dodge | 70. GMC |
| | | 71. Ford |

The spatial pattern of the large truck companies is slightly different since it has responded to other locational factors. As expected there are a number of these truck companies in the Midwest.(Map 4) Some of them are division of the Detroit based auto companies, but most others are independents. No large trucks are produced in Detroit although nearby cities such as Pontiac, Michigan, and Cleveland, Ohio, have truck firms. Others are scattered around the fringe of the industrial Midwest. Large truck plants are located in Louisville, Kentucky(Ford), Allentown, Pennsylvania(Mack), and Fort Wayne, Indiana(International Harvester). Some newer plants have been established even further away, in places such as Roanoke, Virginia(White) and Madison, Tennessee(Peterbilt). In addition to the truck plants in the United States, there are a number in Canada. They are almost all branches of the American companies and are concentrated in the South-western Ontario area.(Map 4) The truck industry is almost non-existent in the large cities of the Northeast such as New York City, Boston or Philadelphia.

There is, however, another area of truck companies. This is the West coast where almost all the major truck companies have either started or established branch plants. (Map 4) The West coast industry is not just a branch of the Mid-western industry. Many of the companies are producers of specialized



trucks which serve not only the Western market but have also expanded to the Midwest and Canada where they have established branch plants themselves.²⁶ As a result the Midwestern companies have expanded to the West while the Western companies have responded by expanding to the Midwest. This true for only the larger truck companies. There are a number of small producers which have usually remained in their original locations. Most of these are in the Midwestern region, in small towns that are some distance away from the major industrial areas. Since they serve a national market and because their product is very specialized, their location does not really make much difference as long as they are economical.

There are many location factors which affect the present day industry and it is necessary to examine them if one is to gain some understanding of the patterns of the truck companies. It is also appropriate to compare the present day pattern to some well known theories of industrial location. This will hopefully give some idea of the various role that the location factors have on the industry and if they can explain the reasons for the present day pattern.

Location Factors

Truck manufacturing is one of those industries which can be called "footloose". A truck plant does not depend a particular site for its existance as does a mine or a shipbuilder. Neither is it so strongly affected by any single location factor that it is forced to locate in a particular area if it is to be successful. The truck industry enjoys a certain amount of flexibility in its choices of location. There are,however,many factors which influence the location of the present day industry.

Although the truck industry may be rather footloose, it still must consider the traditional location factors, such as labour,capital,raw materials, and markets. These factors not only influence the choice of any new location, but they also serve to strengthen or weaken the position of an existing site. They have not always played the same roles as they do now,but in order to give the reader some knowledge about the industry in its present state,it is necessary to briefly examine each of the major factors affecting the industry in the 1970's.

In classical location theory such as Weber's model, firms should locate at the point of least transport costs, these being determined by comparing the total cost of raw material shipments to the total costs of shipping the product to the market.²⁷ Weber used a material index to determine the best location for a company.²⁸ The result was one of "movement minimization" where the ideal location is one which has the least amount of movement of raw materials or finished goods.²⁹ Such a model cannot always work in the truck industry because there are too many other factors.

One of these factors is labour, not the quantity, but the quality and organization of it.³⁰ In Weber's model, labour would attract industry to a location other than the movement minimization one if the savings in labour costs per unit output exceed the extra costs involved.³¹ In many areas of the United States and Canada such situations exist, even with national unions in the motor vehicle industry. In areas away from the well developed industrial regions, living costs are lower and unions tend to be less demanding. This spatial differential in union influence tends to attract firms which fear the problems caused by the militant unions in the more developed areas.

Another factor is the market for trucks, which is not in one specific point as in Weber's model.³² Instead the truck market is spread out all over the country, although there are some regional variations. There is, however, some concentration in the market and certain areas such as the Midwestern region in the United States are very large truck markets. With their high population, and many industries, they have a great demand for trucks. It would therefore be in the best interests of a company to locate in such an area.

If truck firms located in this type of area they would be following Hotelling's model where firms will locate at the center of the market when demand for the product is inelastic.³³ History has shown that the number of truck firms has little relation to the size of the market. Some truck companies have located at or near the center of the market but they seem to be the exception. Companies on the West coast were started in response to the local market and their success can be attributed to their location with respect to the market rather than any other factors. The problem with these companies is that the Western industry was forced to develop independently, it was not just drawn to the west by the market.³⁴

The major truck markets are in the eastern half of the continent and that is where most of the truck companies are located. Even some of the Western companies have set up plants in the Eastern areas. The east also has another determinant of industrial location, the raw materials.

With increasing competition in the truck industry firms attempt to choose the best location. In many cases this is one with the cheapest raw material sources or the most lucrative markets, as measured in transport costs.³⁵ In the truck industry a great number of parts are used and they are almost all purchased from outside suppliers. As the number of suppliers increases so does the total cost of transport. Firms thus try to minimize the distance between them and their suppliers. Since the position of the suppliers is usually fixed, the truck company must locate at a site near the largest number of suppliers. This would greatly improve the "movement minimization" situation with respect to raw materials. But firms do not always choose such sites and tend to deviate from what might be expected in an ideal situation, because of other factors such as labour, amenities, or even accidental or chance factors.

Truck companies like many others do not always locate in the best locations of maximum profit or least costs. They are often able to survive in other areas. Smith's concept of the "spatial margin of profitability" illustrates this rather nicely.³⁶ A company may find that the least cost location might be in Ohio, but other factors such as labour, climate, taxes, etc., make a location in Georgia just as attractive. (Fig.2) It is still profitable as it lies within the spatial margin of profitability. In many cases the locations that developed purely by chance, ~~were~~ more likely to survive if they were within the margin rather than in some isolated site, such as the home town of the inventor or owner.

This factor of chance was another which caused the truck industry to deviate from the classical location patterns. In many cases truck firms located in areas because of the "follow the crowd" attitude. In Greenhut's "minimax" model, uncertainty, rivalry, and competition in an industry such as motor vehicles causes concentration of companies in areas where each firm thinks it can achieve the greatest success.³⁷ In such cases there is a great amount of chance and uncertainty and thus the failure rate is high.

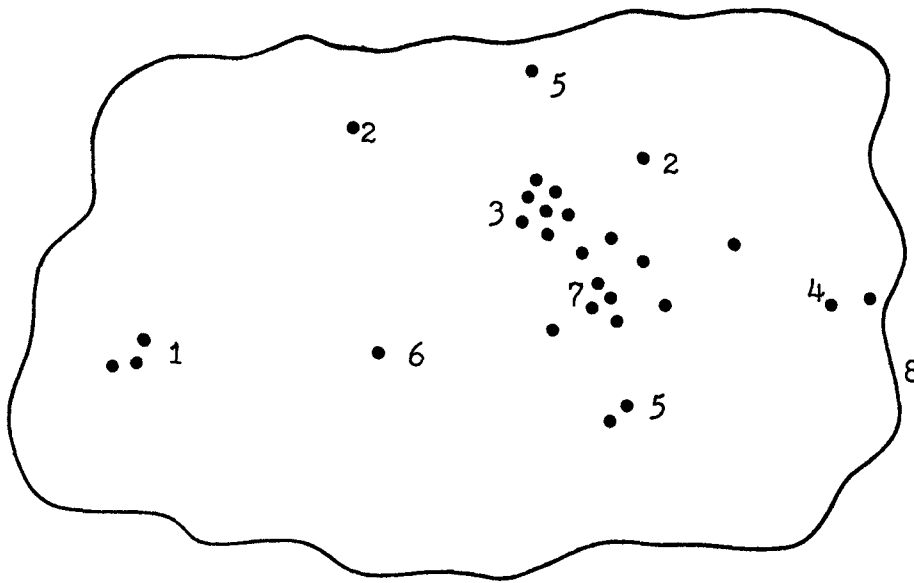


Fig.2; Hypothetical Truck Company Locations

Influencing Factors

1. Isolated market- high transport costs of the finished from the more central factories.
2. Located in the home town of the company owner.
3. Popular location resulting from a "follow the crowd" type of location decision. Also agglomeration of companies for mutual benefit.
4. Initial location of the industry, now barely in existence.
5. Better labour conditions and lower living costs.
6. Very specialized producer serving a national market, its product characteristics allows it to locate almost anywhere.
7. The ideal location, close to markets, labour, parts, etc.
8. The "spatial margin of profitability".

Truck companies have tended to concentrate in certain areas, throughout much of the industry's history. A major reason has been the agglomeration factor where firms group together in order to take advantage of economies of scale, a better developed infrastructure, and skilled labour pools.³⁸ In many cases these concentrations were not always the ideal location in terms of "movement minimization" but they offered enough other advantages to cause the industry to deviate in its location choice. As these areas became better developed they often made it difficult for the company to move to better locations, because of the great amount of capital invested in the location. It was often in the best interests of the firm to try and improve its facilities than to move to another location.

The high cost of building and moving truck plants has made it difficult for a company to expand to other areas. Since capital is available in all areas it is not the location factor it used to be. It does however tend to keep truck plants in their original locations.

The truck industry is affected by a number of location factors which cause it to deviate from a pattern based on classical location theory. Truck companies have located at the market ,at raw material sources,at favourable labour areas,and in places somewhere in between. One problem in applying the location pattern of the truck industry to theory id that much of the present day pattern is the result of past decision making much of which was just chance or accidental.

This factor of "historical accident" has played a role in various other industries,but it is particularly applicable to the truck industry.

The role of chance as a location factor in the modern industry is not very strong because the great amount of capital involved prompts decision makers to select locations very carefully and with much study. A new truck plant will not very likely locate in an area away from the spatial margin of profitability and the boundaries of this margin are usually well known by the decision makers. Since location changes are so few in number at the present time,much study is likely to be done before a move is made.

In many cases, however, the industry does not conform to the ideal location pattern. This is because the present day pattern reflects the decisions of the past, a period when chance or accident played a much more important role. Companies were often founded in the home town of the owner and they have continued to stay there even though the location is not one which would have been picked today.

Few of the early companies chose sites on the basis of location studies. Most were the result of chance or the "follow the crowd" method of expansion. If one firm was doing well in one area then others soon flocked there with hopes of similar success.

In addition to chance factors there were others in the past such as the acceptance of the truck, changes in production methods, road conditions, and engine types. All have little application in classical location theory but they were very influential in determining the spatial pattern of the industry. It is therefore necessary to examine the growth of the industry through time and to point out how the past has influenced the patterns that exist today.

Footnotes to Chapter Two

1. Montville J., Wheels For Commerce, in, The American Car Since 1775, Automobile Quarterly Publications, New York, 1971, pg. 377
2. Trucks have also been called, commercial cars, conveyance vehicles, and automobile trucks.
3. Karolovitz R.L., This Was Trucking, Superior Publishing Co., Seattle, 1963, pg. 19

Most of the early vehicles were developed in Europe and were actually intended to be commercial vehicles, rather than just for pleasure. Cugnot's steam tractor of 1770 was designed to pull artillery, and Trevitheck's steamer of 1801 was really a bus. In the United States, Evans of Philadelphia designed and built a steam tractor in 1804 for commercial use.

4. Casson H., Hutchinson R., and Ellis L., Horse, Truck and Tractor, F.G. Browne & Co., Chicago, 1913, pg. 60

By 1912, trucks had displaced only 1% of all the horses in the United States and Canada. For commercial use, the number of horses actually rose by 33%. Only for personal transport did the horse decline, by 25%.

5. Montville J.,1971,op.cit., Pg.399

By the 1920's the electric trucks had fallen far behind the rapid technological gains made by the gasoline engine. Its only markets remained in the large cities.

6. op.cit., pg.399

Some of these improvements were, the invention of steel wheels,the pneumatic tire(by Goodyear),larger engines,and air brakes.

7. Bus and Truck Transport,Canadaian Size and Weight Regulations for Commercial Vehicles,Sept.,1977,pp.50-51

8. Polk R.L.,Motor Statistical Services, New Truck Registration Reports, Detroit,Michigan,1977.

9. Bus and Truck Transport,op.cit., pg.50

Gross Combination Weights in Canada in 1977 ranged from 78,000 lbs. in Nova Scotia, to 140,000 lbs. in Ontario.

10. Motor Vehicle Manufacturers Association, Facts and Figures, Detroit,Michigan,1977, pg. 11

In North America over 90% of all Group 8 trucks were powered by diesel engines.

11. The large Group 8 trucks are usually built to order and the customer can chose from a selection of engines from four different manufacturers,transmissions from three,rear axles from three,front axles from two, and an assortment of seats,cabs,sleeper boxes, brakes,etc. All of this costs money and the average large truck costs over \$40.000.

12. Motor Vehicle Manufacturers Association,op.cit., pg. 8

In 1977,the all time record year, there were 10.376,081 passenger cars produced in the United States and Canada. Over 98% of these were by General Motors, Ford,and Chrysler.

13. This was calculated by dividing the population of the state by the number of passenger car registrations.

14. Although the New York subway system has other problems it does work well, it has to, with the huge number of people that depend on it each day.

15. The figures for truck distribution were calculated by dividing the population of the state by the number truck registrations.

16. op.cit.

17. This was determined from a number of sources. See the footnote to Map 6.
18. Ford started truck production in 1917 and the others were quick to follow. For short histories on the various truck companies see, Ward's Automotive Yearbook, Detroit, Michigan, 1955 and 1977.
19. op.cit.
20. Rhys D.G., Heavy Commercial Vehicles: The Survival of the Small Firm, Journal of Industrial Economics, July 1972, pg. 233.
21. Freightliner Trucks, Information Brochure, 1977
22. The major exceptions to this are International which makes about 18% of its diesel engines, and Mack which makes not only 90% of its diesel engines but also most of its axles, transmissions, and bogies.
23. A truck buyer is faced with a choice of over 15 different engines, 20 transmissions and 10 axles in a typical truck. This has been determined from the option lists supplied by truck companies such as Mack and Kenworth.
24. Even a company such as Mack offers not only its own built components but most of these built by the other suppliers as well.

25. Almost always the small truck assembly plants are located in the center of a major automobile market. To take advantage of economies of scale, the truck and car plants are built near each other since both of their markets are similar.

26. See Map 13

These branch plants were established so that the Western companies could serve the Eastern markets more easily.

27. Hamilton F.E.I., Models of Industrial Location, in, Haggett P., and Chorley R.J., eds., Models in Geography, Methuen & Co., London, 1967, pg. 371

28. op.cit., pg. 370

29. op.cit., pg. 370

30. In truck manufacturing a considerable amount of skilled labour is needed. Most companies also seek areas where the labour unions are the weakest.

31. Hamilton F.E.I., op.cit., pg. 371

32. op.cit., pg. 370

33. op.cit., pg. 377

This has often been illustrated using two ice cream vendors locating on a beach.

34. The market in the West was not large enough to attract the companies from the Midwest. But, because the Midwestern trucks that were shipped to the West were not always suitable for Western conditions, the area had little choice but to establish its own small industry.
35. Hamilton F.E.I., op.cit.pg.371
36. Smith D.M., A Theoretical Framework for Geographical Studies in Geography, Economic Geography, April, 1966, pg.103
37. Hamilton F.E.I., op.cit., pg.380
38. op.cit., pg.371

CHAPTER THREEThe Experimental Period, 1898-1909

Although this initial period in the development of the truck industry begins in 1898, the truck, or at least the commercial vehicle, has a much longer history. Many of the early developments in Europe, such as Cugnot's steam tractor of 1770, and Trevithick's steam bus of 1801 were designed primarily for work rather than pleasure.¹ In the United States there were a number of early developments in steam tractors designed for possible commercial uses, although without much success.² These early attempts at producing a practical commercial vehicle were greatly limited by the many problems associated with steam engines. The large, heavy, and even dangerous vehicles were often too cumbersome to use, especially on the poor roads of the day. It was only with the development, in the 1890's, of the more compact gasoline engine and electric battery power sources, that the self propelled vehicle began to become even marginally practical.³ The steam truck continued to be popular in Great Britain, but except for a few small companies in the American Northeast, it failed to gain much acceptance in North America. The North Americans were more interested in trying to develop the newer power sources.

The advantages of the gasoline and electric battery power plants was at first not very overwhelming. They were very unreliable, underpowered, and almost as difficult to use as the large steam boilers. In 1895 they were still in their early stages of development and neither had much of an advantage over the other. By 1900 there were, however, some advancements being made, especially with the electric storage batteries.⁴

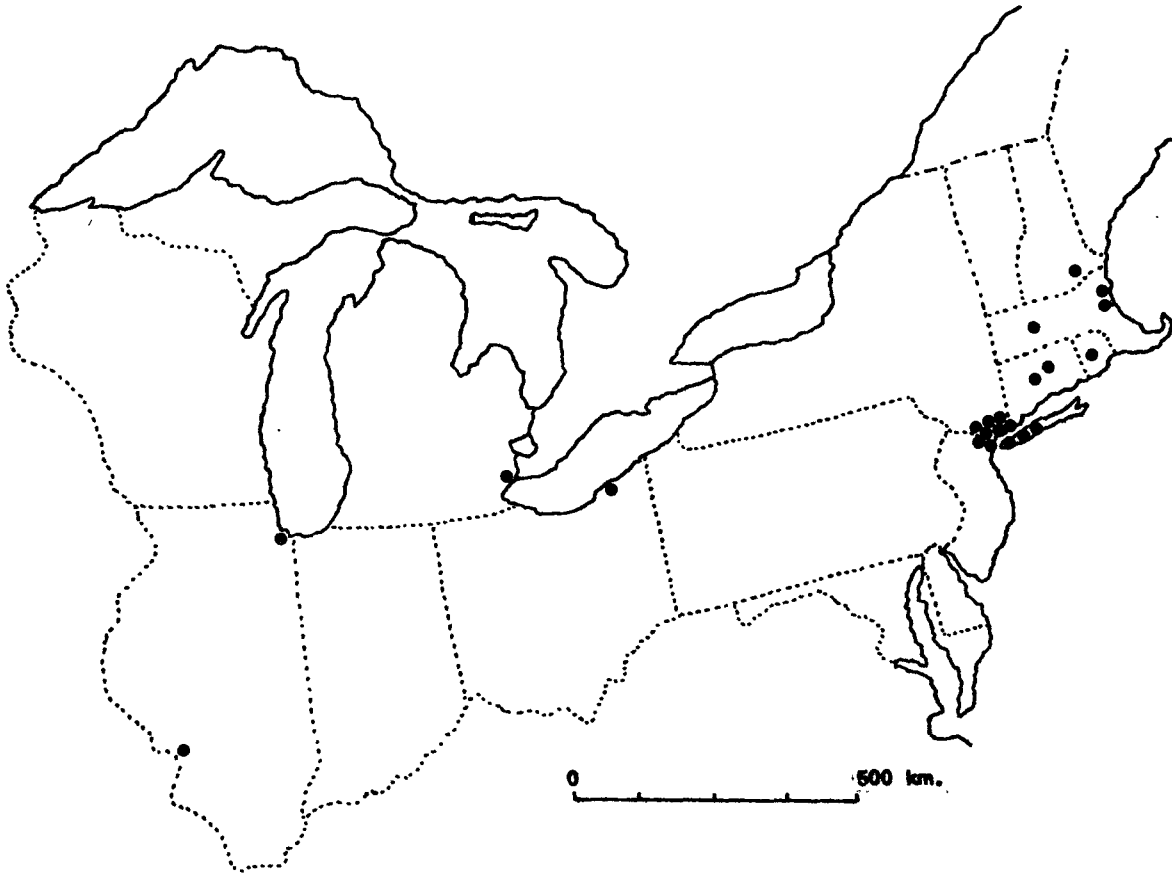
Although the electric became the most popular, it was not perfect and the early truck builders experimented with many other types of power, in a great variety of chassis and body designs. Few trucks were even similar to each other as each "inventor" attempted to prove his ideas of truck design. Actual truck production was unheard of, mainly because the vehicles were either too difficult to build, impossible to sell or both. No one really knew what the best design was and experimentation and trial and error testing was the name of the game. Few even took the truck builders seriously and even fewer saw any future for a commercial "horseless carriage" as long as there were plenty of cheap horses available. As a result there were a number of pioneers in the "industry" trying to first build a product and second to sell it, which was often the hardest part.

Concentration in the Northeast, 1898-1905

These pioneers in the industry were not scattered randomly throughout North America. Instead there was a definite concentration in the Northeastern part of the United States. As early as 1898 trucks of some sort were being built in such places as Hartford, Connecticut, and Springfield, Massachusetts, and especially New York City.⁵

In 1900 there were 22 truck companies in North America, and 18 of these were in the Northeast, 11 of them in New York City alone. (Map 5) Outside of New York only Boston had any significant number of truck builders, although some of the other large cities did have a few companies. Many of the other companies were located in some of the old industrial towns of New England, especially those using steam engines for power. In addition to these 22 companies there were no doubt many more which were started with good intentions but failed to produce anything but an experimental vehicle. Since most of the successful activity was in the Northeast, it can be assumed that this area was also popular with the less successful ones.

Of the companies that actually produced some trucks, few were very large. Because production figures for the early years seem to be non-existent it can only be estimated that



Map 5; TRUCK COMPANY LOCATIONS, 1900.

**Source; Automobile Quarterly, The American Car
Automobile Quarterly Publications, New York, 1974**

**Georgano G., The World's Commercial Vehicles,
Temple Press, London, 1965**

**Doolittle J.R., The Romance of the Automobile
Industry, Klebold Press, New York, 1916**

Ward's Automotive Yearbook, Detroit, 1977

total production in 1900 was about 100 trucks.⁶ This was shared by 22 different companies so the average per firm was not very large. The main problem facing these firms was actually building the truck, since there were few examples to follow. This, however, did not prevent new firms from entering the industry and after 1900 the number of producers began to gradually increase.

In 1901 there was the first sharp increase in the number of entries into truck production. In that year there were 16 entries and only 7 exits. (Fig. 3) Four years later in 1905 there was a total of 54 truck companies in operation. The failure rate for these companies was very high and few managed to stay in business for more than a year or two.⁷ Between 1900 and 1905 there was a total of 45 firms that went out of business. In many cases those that were able to survive did so because they were already well established in other lines of business.⁸

The majority of these new firms located in the Northeastern region of the United States, especially in the New York City area. There were many reasons why the truck industry initially developed this spatial pattern, and it is necessary to examine some of them in greater detail.

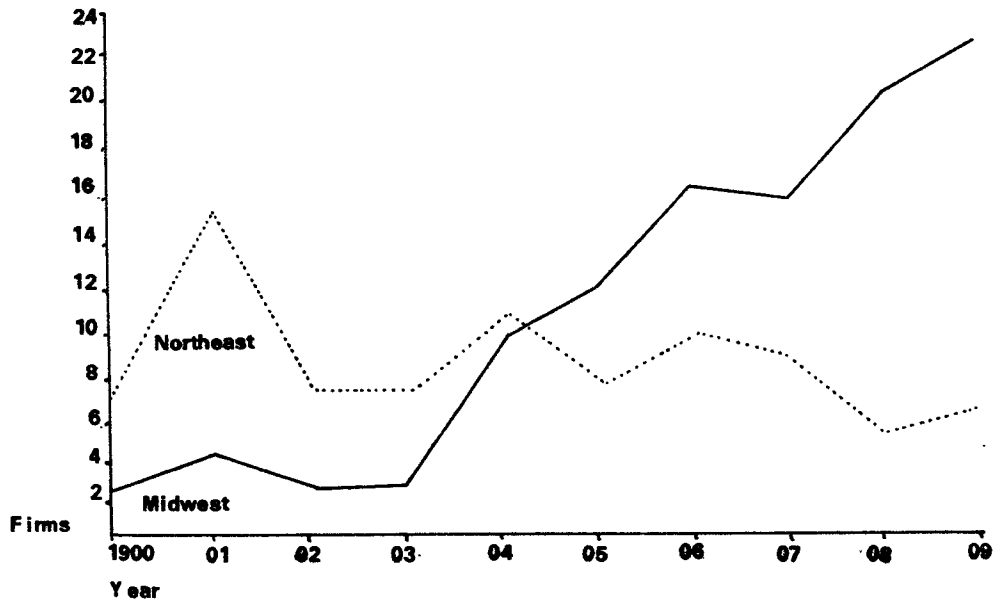


Figure 3 TRUCK INDUSTRY ENTRIES, 1900-1909

Source; See note to Map 3

Reasons For the Concentration in the Northeast

The truck in 1900 was still a very primitive and untried invention, and its design and method of production was still undergoing much experimentation. Although it was possible for almost any mechanically minded person to build an experimental vehicle anywhere in North America it was in the Northeast that most of the activity was concentrated. Much of this could be explained by the location and prominence of New York City.

Location

New York City, being the first order center in the flow of information was the first to receive news of innovations in the motor vehicle industry of Europe.⁹ An inventor located in New York or in some other important Northeastern city, had access to this information well before those in the other parts of the country. In addition, the large number of potential inventors and entrepreneurs in the Northeast made it much more likely for a new innovation to be adopted there rather than some other areas of the country. Innovations would first flow to or from New York City, and then diffuse to the surrounding towns, and later to the more distant cities.¹⁰ Proximity did not however ensure the establishment of truck companies, there had to be other conditions.

People One of these conditions was the existence of people who were willing to either invent, build or finance the truck. The many industries both in New York and in the surrounding industrial towns often had owners or even employees who were capable of experimenting with truck building.¹¹ In many cases small truck firms were set up in the home town of the inventor or financier.¹² No great consideration was given to location factors such as markets, labour supply or raw material sources. The location process was merely accidental since there was no sound economical basis used. This accidental development however could not have taken place in some other areas of the country which did not have the human, and physical resources of the Northeast.

The Economy Not all of the truck firms were started by individual inventors. In fact most probably had their origins in existing firms.¹³ Since the Northeast had over 75% of the country's manufacturing output, it thus was a primary location for any new firm to locate in.¹⁴ Although many of the industries were oriented towards textiles or footwear, there was a very large concentration of metalworking industries in the region. The New England states, especially Massachusetts and Connecticut accounted for over 40% of the American metalworking industry in 1900.¹⁵ There were also many other towns which were well

known for such products as stoves,boilers and wagons.¹⁶

The makers of these products were often well equipped to diversify into truck building. They were often already involved in activities that were in some way related to the motor vehicle. There were many similarities in the production of wagons,engines,or locomotives,and trucks.¹⁷

Entry into truck production was quite natural for these firms since they were already using metal parts,axles,gears, and paint,all of which were used to some degree in trucks.¹⁸

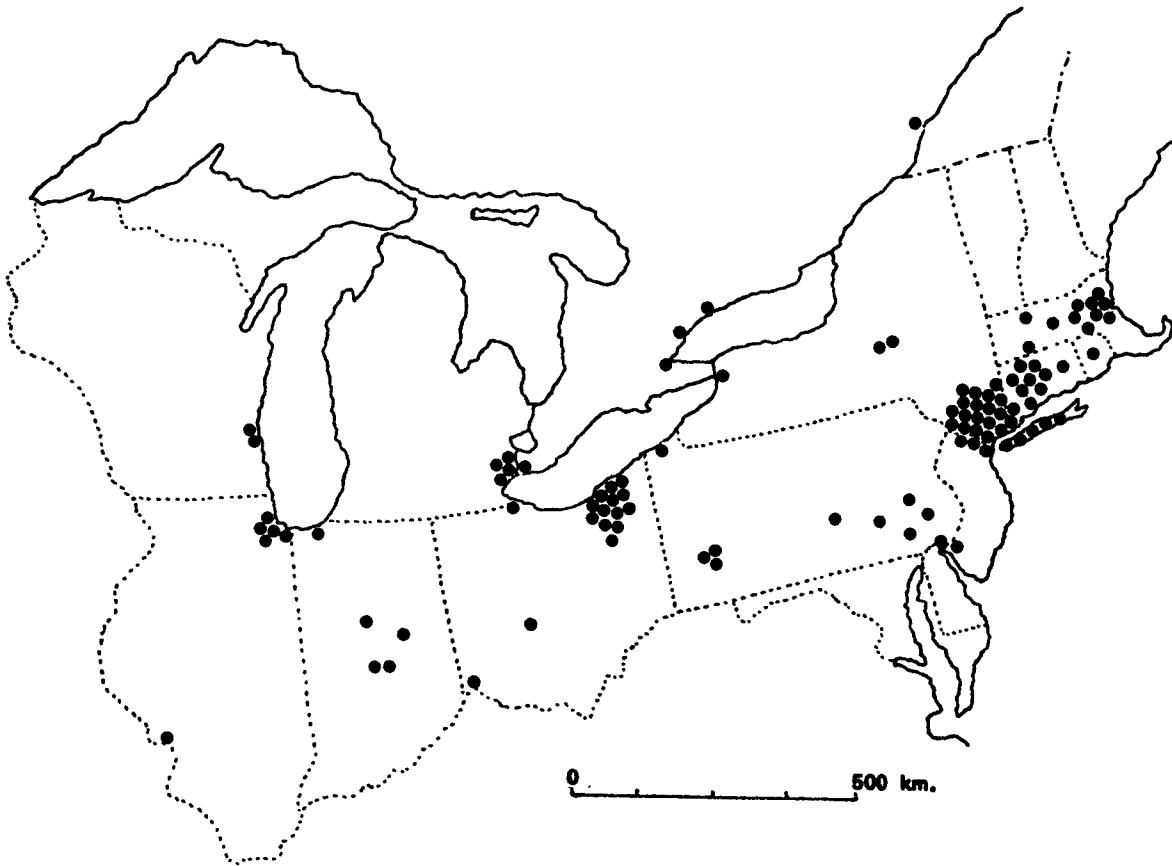
The existing firm also had the advantage of already having the necessary land,buildings,and machinery needed for truck production. This was an important factor since it greatly reduced the amount of capital to be raised, especially when financing of a new and as yet unaccepted product such as a truck was very difficult to obtain. In fact financing was as difficult to obtain as parts for the new trucks.

Parts Since the early trucks were mainly experimental prototypes,parts were a problem not only for the purchaser, but for the builder as well. To produce a truck the builder had the choice of making almost every part himself or buying them from outside suppliers.¹⁹ Since the former method required much capital for machinery,very few opted

for that method. The most common procedure was to purchase the parts from outside firms which already made parts or had machinery which could be adapted for parts production.²⁰

A great variety of parts was needed by the truck companies, and it soon became apparent that there were advantages to be gained if the truck builder located near the parts supplier. It was important to have both the parts supplier and the parts user in close proximity to each other because in these early years, truck designs and thus parts needs, were changing so rapidly that there had to be a considerable exchange of ideas among all participants.²¹ There were also economic advantages such reduced transport costs, and less of a chance of disruption in parts deliveries.

If a truck company wanted to locate near existing or future parts suppliers it had little choice but set up operations in the Northeastern region. Almost all the parts suppliers were in this area, as were most of the industries which might diversify into parts production. (Map 6) As a result the parts industry which had already begun to develop to serve the automobile industry proved to be an influential location factor for the truck industry. There were, however, some other factors which helped to determine the locational pattern of not only the truck industry but the parts industry as well.



Map 6: PARTS SUPPLIERS, 1905

Source: Doolittle J.R., *The Romance of the Automobile Industry*, New York, 1916

Labour The early trucks were, in almost every case built individually by skilled craftsmen.²² Assembly line and mass production methods were unheard of, and even if they had been, there just was not a market large enough to support high volume production. Because of the amount of skilled labour involved in producing a truck, the early builders were not likely to locate in areas where appropriate skills were not available.

The major area with such a labour pool was the Northeastern region of the United States. Many of the skills involved in wagon making and metalworking were not fundamentally different from those needed for building trucks.²³ Although there was some discontinuity in terms of the final product, there were many significant continuities with respect to the methods of production. The easy transfer of skills decreased the need to retrain workers for truck production.

The need for skilled labour also prevented the truck industry from expanding to other parts of the country. The amount of labour needed by the young truck industry was not very great and as such would not have been an important location factor. The main impact of labour was that it had attracted the parts industry to the Northeast and as a result the truck industry was attracted there as well.

Market The production of the truck was only one step, and if the company was to be successful it also had to sell the truck. The Northeast with not only the greatest concentration of population in the country but also most of the industry, provided a large potential market for trucks. There were, in addition to the size of the market, other factors which made the Northeast the most important. These factors, such as the road conditions and the problems with the truck itself, limited the use of trucks to certain areas.

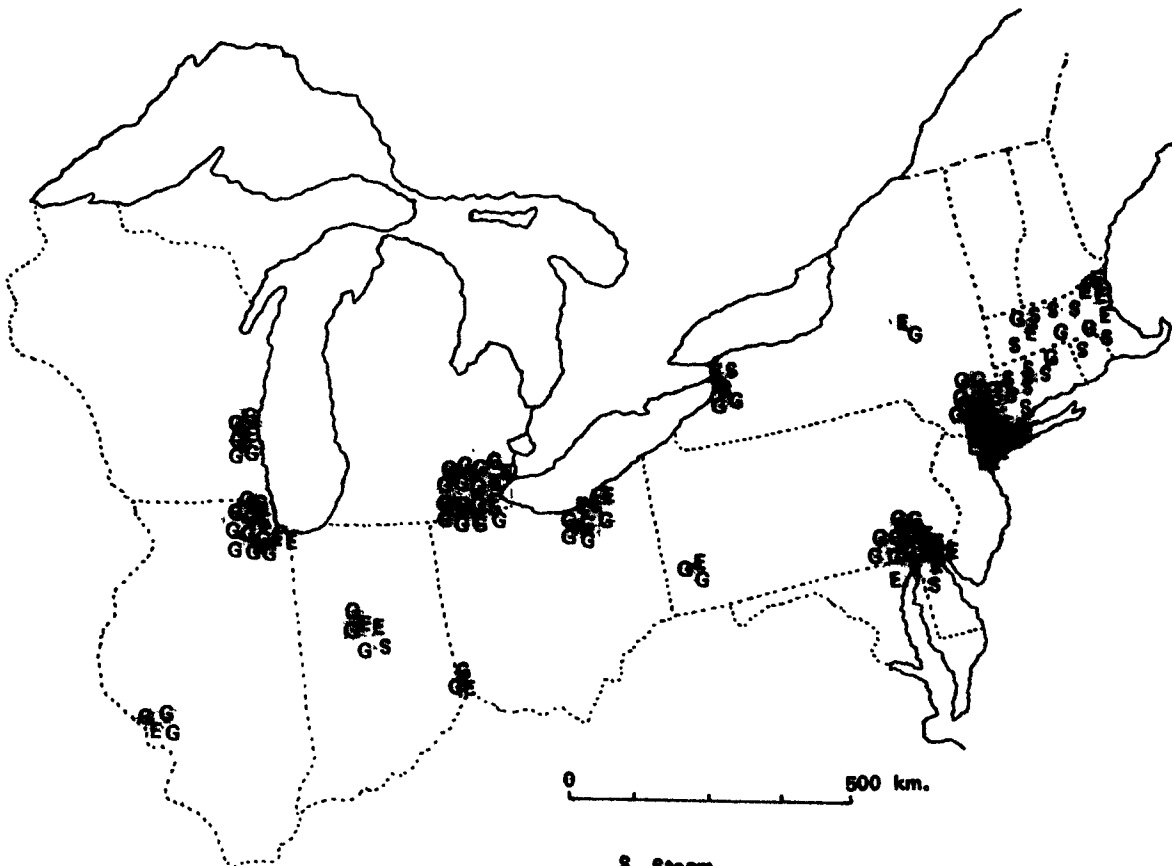
In 1900, and for many years after, the roads were so bad that they restricted truck use in many areas. The following quote is a good example of the road conditions of the day;

"In the United States roads as they are known in the Old World, exist only within the purlieu of the well established cities. Once beyond these city boundaries, the highway gives way to an ill defined track, full of holes, with its surface a stratum of treacherous dust, inches in thickness in summer, and little more than a quagmire and pools of slime in wet weather."²⁴

With conditions like these, the early truckers often spent more time in the road than travelling on it. In some areas the roads were so bad that at times even horses could not be used. Any long distance travel was usually made by trains on the well developed rail network of the Northeast.²⁵

The poor road conditions were accentuated by the problems of the truck itself, and its inability to operate in anything but the best conditions. This situation resulted from the fact that in 1900 the most common truck type was one powered by an electric storage battery.²⁶ The majority of the firms operating in the Northeast built electrics which were popular in the large cities. (Map 7)

The electric had certain advantages which enabled it to become the best seller. It was quiet, very economical to operate, and reliable. These were ideal characteristics for use in the city where there was much stop and go travel, and many short trips. Businesses such as bakeries and delivery companies were willing to put up with the disadvantages of high weight and the need to recharge the truck's batteries after every few trips.²⁷ Because the electric truck could only travel short distances on the best roads, its range of operations was greatly limited.²⁸ It could not be used with any great success in the rural areas or for inter city transport.



Map 7;
TRUCK COMPANIES BY ENGINE TYPE
1895-1909

S Steam
E Electric
G Gasoline

Source; See note to Map 5.

With such a limited market the truck companies tended to concentrate in the large cities, which were most common in the Northeast. (Map 7) Some other firms were set up away from the Northeast but they too located in the large cities because they were really the only places where trucks could be effectively used.²⁹ There were some alternative power sources such as steam and gasoline but they were not much competition before 1905. Their poor record of reliability and problems of manufacture made them inferior to the electric truck.

In the early years after 1900 the truck market was then limited to the major urban areas. Since the largest concentration of these was in the Northeast, that gave the region another advantage in attracting the truck industry. Although there were many reasons for the initial concentration of the industry in the Northeast probably one of the most important was the fact that the type of truck prevented the industry from expanding to different markets and away from the urban areas with their good roads. As long as the truck was unable to effectively compete with the horse in the rural areas, the industry would continue to be concentrated in the Northeast. But such would not be the case as technological innovations would change the spatial pattern of the industry after 1905.

Westward Expansion

The dominance of the Northeast as the center of the truck industry was not to last very long. By 1905 much of the new activity had begun to shift westward to other areas of the country. There were actually two separate trends developing by 1905. One was the shift of firms from the Northeast to the Midwest, while the other was the development of a separate industry in the Midwestern cities.

The first sign of a decline in the Northeast was the movement of some firms away from the New York City area. A number of firms left New York and moved west to a group of industrial towns in Pennsylvania. These towns, such as Allentown, Bethlehem, Reading, and Scranton, had long been centers of steel production, and the manufacture of railway equipment.³⁰ After 1900 these towns had begun to decline as the textile industry left for the south and the railway equipment industries showed little growth.³¹ Many vacant factories were left behind as was a skilled labour force, and a well developed infrastructure of parts suppliers and metalworking shops. Since the towns were close to the large markets of New York and Philadelphia but offered more room for expansion and cheaper production costs, they became attractive as locations for truck companies.

One of the companies to make the move from New York was a small firm operated by the Mack brothers. As was the case with some other companies, it was finding it very difficult to expand in the New York area. Learning of the situation in Pennsylvania, they decided in 1904, to relocate their company in Allentown, a city almost halfway between New York and Philadelphia.³² (Map 10) Although any of the towns in the area could have been a possible location, Allentown was chosen because another Mack brother had already established himself there. The choice of Allentown was as much accident as it was a planned decision.

A company such as Mack was able to move away from New York because of the type of truck it produced. Unlike the majority of the companies in the Northeast, Mack was a builder of trucks with gasoline engines. (Map 7) This freed them from confines of the urban markets as their trucks could be used, at least with some success, in a greater range of operating conditions. They could operate on rural roads unlike the electrics and that opened up new markets for them. This characteristic was to become more common after 1905, not only in Pennsylvania but in other areas of the country as well.

The Midwest The truck industry had been steadily increasing in numbers of firms and production, since 1900. At first almost all of this activity was confined to the Northeast, but by 1905, some changes began to occur. Between 1900 and 1909, the number of firms in the Northeast increased from 18 to 27. (Fig. 3) By comparison, the number of firms in the Midwest rose from only 4 in 1900 to 36 in 1909. Almost all of this increase occurred after 1905 when the Midwest began to be the most popular location for new truck companies.³³

There were actually two milestone years, one for production, and the other for the number of companies. In 1907 the Midwest first had more firms than the Northeast, and in 1909 it had more production. The lag in production was caused by the fact that the new firms in the Midwest were small at first and it took them a few years to get established and begin any significant production. (Fig. 4)

It should be noted that the Northeast was declining only in relation to the Midwest, and in fact the truck industry was growing in absolute terms. It could not match the tremendous growth in the Midwest which increased its share of truck companies from only about 10% in 1900 to well over 50% in 1909.³⁴

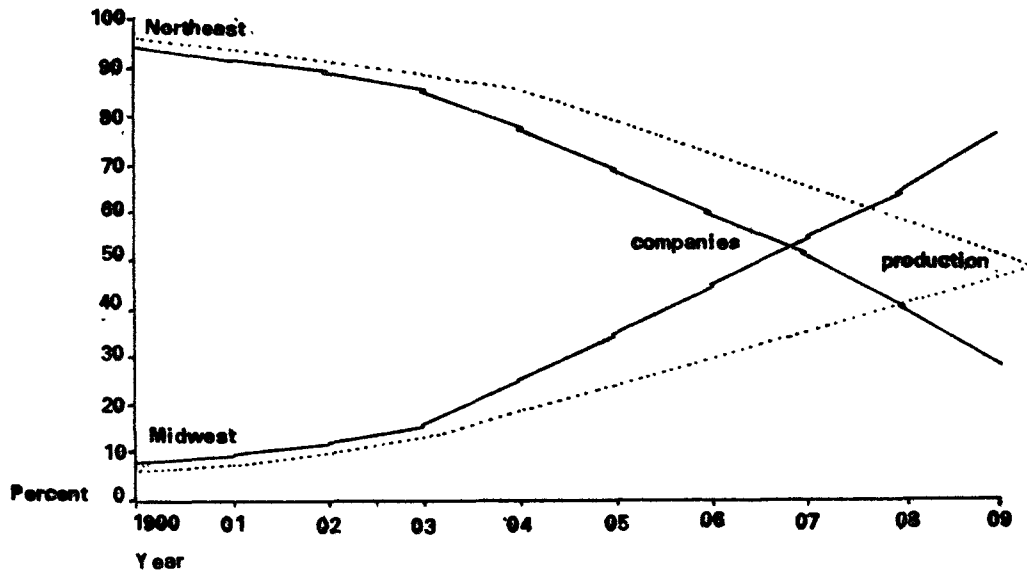
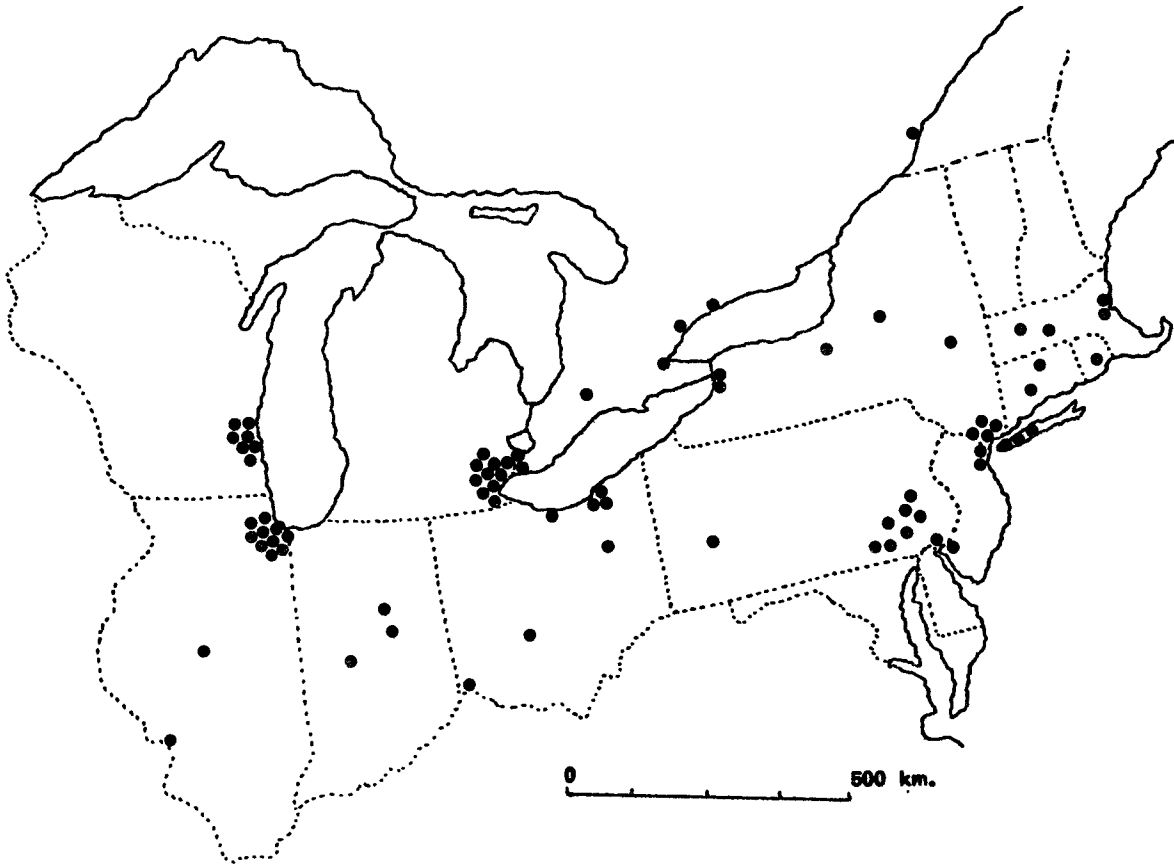


Figure 4 SHARES OF PRODUCTION AND COMPANIES,
MIDWEST AND NORTHEAST

Source; See note to Map 5

Before discussing the Midwest it is perhaps necessary to define what the area is. The area that is commonly referred to as the Midwest includes the Great Lakes states such as Michigan, Ohio, and Illinois. It could also include, at least geographically, if not politically, the southwestern part of Ontario. In the Midwest there are a number of large cities including, Detroit, Chicago, Cleveland, and Milwaukee.

These large cities had truck companies as early as 1900 and were among the first to have any significant number of trucks in commercial use. (Map 5) Although there were some pioneer companies in the region it lagged far behind the truck industry of the Northeast. It was not until 1905 that the number of truck firms in the Midwest began to increase substantially, and by 1909 over half of all truck companies were located in the region. In that year there were 10 companies in both Detroit and Chicago, and another 7 were located in Milwaukee. In fact these three cities accounted for 30% of all truck companies in the United States in 1909. (Map 8) New York City, which had completely dominated the industry in 1900, could only account for 10% of all companies in 1909. This change in concentration from the Northeast to the Midwest was not gradual but was instead very sudden as it occurred in only a few years.



Map 8: TRUCK COMPANY LOCATIONS, 1909

Source: See note to Map 5.

This change in the spatial pattern of the industry was caused by a number of factors, with the two most important ones being technological improvements in the truck itself and the development of new engines using gasoline as fuel. These factors were to prove to be even more influential in affecting location than economic factors such as transportation, labour, and markets. These other factors cannot, however, be ignored since they were often very closely linked with the developments of truck technology. In addition there were many companies which located in the Midwest purely by accident as was the case with many firms set up in the home town of the owner or inventor.

To understand why the industry suddenly flourished in the Midwest it is necessary to examine the roles that some of the factors played. It is also necessary to compare what had happened in the Northeast to what was happening to the industry in the Midwest after 1905.

Reasons for Location in the Midwest

Location In terms of location, the Midwest really had no great advantage over the Northeast. In fact it was probably at a disadvantage since it was located far from the major urban markets. While the region did have the Great Lakes system which could have provided excellent and cheap transportation, it did not really need it.³⁵ In 1905 the truck industry, and even the whole motor vehicle industry was too small to require much high volume transport. Total truck production was only 700 per year and the firms were all very small. Raw materials requirements were all small and could easily be provided by local sources. Markets were also local so very little was exported from the region.

One factor which may have had some significance was the proximity of the steel industries in Pittsburgh. The Pittsburgh Plus pricing system had been established to prevent the dispersal of the steel industry to other parts of the country.³⁶ It added to the price of steel the cost of transport from Pittsburgh. Thus a steel producer in Chicago would have to sell his steel at the same price as Pittsburgh, plus what it would cost to transport it there.³⁷

This pricing system probably had some influence on the location of the parts industry, but since the truck industry bought almost all of its material requirements in finished form it was not an important factor. It was usually cheaper to ship unfinished steel from Pittsburgh to a place like Chicago than to ship the finished products to market from Pittsburgh.³⁷ As a result, both truck companies and parts builders located close to the markets.

The Parts Suppliers Just as had been the case in the Northeast, most of the new truck firms preferred to purchase their parts from outside suppliers. In the Midwest there were far fewer potential parts suppliers, but they were in most cases much more appropriate ones. (Table 3.) Instead of having many textile factories, the Midwest had considerable numbers of small companies, producing such products as farm machinery, tools, and engines, all of which could easily adapt to parts production. The state of Ohio was an important area for the machine tool industry, with over 40% of the nation's output.³⁸ Cleveland was a center for parts manufacturers and Akron was the main city for the production of rubber products with firms such as Goodyear Rubber Products.³⁹ (Map 6)

Table 3 : Selected Industry Shares, 1909

	Northeast	Midwest
Farm implements	17%	76%
Gasoline engines	18%	80%
Tractors	11%	86%
Textiles	77%	19%
Footwear	82%	10%

Source: Abstract of the Census of Manufacturers.

U.S. Dept. of Commerce, 1909-1914, pg. 265

One of the components produced by these existing or potential parts suppliers was the gasoline engine. Of all gasoline engine companies in the United States, 80% were in the Midwest, in the large cities such as Chicago and Detroit. There were however many others in the small towns in the agricultural areas which served as distribution centers. This gasoline engine industry was much further advanced than in the Northeast and it would prove to be one of the major factors affecting the spatial pattern of the industry after 1905.

The Gasoline Engine Of all the many machinery producing industries in the Midwest, the most significant was the small group of gasoline engine manufacturers. The gasoline engine had been in use in the Midwest even before it became popular as a power plant for motor vehicles. Numerous engine builders had been established before 1900 in Cleveland, Chicago and many smaller rural centers.⁴⁰ They were started to serve growing markets in various agricultural applications and on the Great Lakes boats which needed small engines.⁴¹

In 1900 this existence of a gasoline engine industry was not much of an advantage since other types of engines were more popular. By 1909 the situation had changed as the gasoline engine improved considerably while the steam engine and the electric storage battery experienced very little improvement. The greater flexibility of the gasoline engine allowed it to be used in trucks that could be operated in areas outside the good roads of the large cities. When it became evident that the gasoline engine was the best choice, and buyers began to want only that engine, the Midwest with its existing gasoline engine companies was at a definite advantage compared to the Northeast where most steam and electric trucks were produced. (Map 7)

By 1909 some very distinct regional variations had developed in the truck industry according to engine type. Of all companies established between 1900 and 1909 over 40% used the gasoline engine. The greatest concentration of these was in the large Midwestern cities such as Detroit and Chicago.(Map 7) Very few steam or electric trucks were built in the Midwest. These engines were the most popular in the Northeast, especially New York City, where most of the electric truck companies were located. (Map 7) Steam engines were most common in the New England states such as Massachussetts and Connecticut, where some of the oldest companies were located.(Map 7) In the area just west of New York City there were a number of gasoline engine companies, most of which had been established after 1905 as some of the industry began to move westward.

In almost every case the companies that moved west or established initially in the Midwest, used the gasoline engine for power. The technology just had not been sufficiently developed in the Northeast. Although it had been the initial innovation source for the truck it's decision to try and improve an existing power source rather than experimenting with a new one eventually caused it's decline as an important center of truck production.

The superiority of the gasoline engine was not the only reason for the growth of the industry in the Midwest. Although it did help to make the truck's potential market much greater, there were still the problems of building the truck and raising the necessary capital, which had been serious obstacles to truck production in the Northeast.

Capital Although the rather small amount of capital needed to start a truck company made entry into the industry quite easy, most aspiring entrepreneurs were not even able to do that. In the Northeast, the conservative bankers of New York were usually unwilling to provide financing for such risky ventures as truck companies.⁴² The failure rate was extremely high for these early companies and the truck was not even accepted as a viable means of commercial transport.

Over in the Midwest, the situation was quite different. There, bankers and other financiers were much more willing to take a chance on something new.⁴³ The economy of the region was booming and many had made fortunes by taking risks in the expanding frontier. A different financial climate helped many truck companies in their search of capital. Banks were not the only source of money as many other businesses such as hotels, department stores and wagon makers either expanded into, or financed truck producers.⁴⁴

Many of these investors had seen the rise of the automobile industry and they were betting on a similar growth rate in the truck industry. Actually the auto industry, which had established in the Midwest earlier than the truck industry, would play an important role in the growth of the truck industry in the same region.

The Automobile Industry In North America, the automobile was accepted much more rapidly than the truck. Although both industries had by 1909 solved the basic problems involved in actually building the vehicle, it was only the automobile industry which found success in the marketplace. In 1900, truck production was only about 100, and in 1909, even though there had been a tremendous increase, total truck production was only about 3,300 per year.⁴⁵ By comparison, in 1909 almost 124,000 passenger cars were produced in the United States.⁴⁶

Almost all of the new automobile companies located in the Midwest, especially in Detroit. Although some other city such as Cleveland would have been a better choice economically, Detroit quickly became dominant because of historical accident.⁴⁷ The early pioneers in the industry, notably Henry Ford and Ransom E. Olds, had chosen Detroit and as their companies became successful others quickly moved to Detroit.⁴⁸ As a result

in 1909 there were 35 companies producing passenger cars in Detroit.⁴⁹ In addition to Detroit there were many car companies in Chicago and Cleveland as well as in many of the smaller cities in the Midwest. Almost all of these companies used the gasoline engine for power so their markets were not limited to the large cities.

As this automobile industry grew it caused the development of a large parts industry. Although for many years the majority of parts suppliers were located in the Northeast, there were increasing numbers of them locating in the Midwest after 1905.(Map 6) The parts industry flourished because even the large producers such as Ford were basically assemblers of parts and manufactured very few of their own.⁵⁰ With such large numbers of parts suppliers the region became an attractive location for truck companies as well.

The success of the auto industry provided a well developed infrastructure in which the truck industry could develop. It also made the availability of capital much easier since it was often assumed the the truck, being similar to the car would also become a commercial success. Without the automobile industry in the Midwest, the truck industry would probably have remained concentrated in the Northeast.

Summary The truck industry initially concentrated in the Northeast because of a number of factors related to the market, truck technology, and certain economic advantages which made it the best possible location at the time. The most advanced and most popular truck was the electric, but its market was confined to the major cities. Thus the type of truck, combined with the poor roads of the period prevented the truck industry from expanding out from the urban areas of the Northeast.

By 1905 the gasoline engine began to be the superior power plant and the truck companies that had located in the Midwest, where the gasoline engine was already in widespread use, had an advantage over the Northeastern companies. With the gasoline the truck became much more flexible and it could be used in a greater range of markets. With other advantages in the Midwest, such as the booming automobile industry, easy availability of capital, and growing rural markets, the truck industry grew very rapidly and by 1909 the majority of both companies and production was located there, rather than the Northeast. The Northeast, although it still had a sizable truck industry was no longer the leader it had been in the early years of the industry. After 1909 the truck industry would spread out even further from the region of initial concentration.⁵¹

Footnotes to Chapter 2

1. See footnote 3, Chapter 2
2. op.cit.
3. Glover J.C., and Lagai R.L., The Development of American Industries, Simmons-Boardman Pub. Co., New York, 1959, pg.234-235.

As early as 1860 Lenoir in France had developed a successful internal combustion engine. It was later modified by Otto in 1876 and Benz in 1885. Levasser adapted the engine to a frame and in 1892 Panhard produced the basic motor vehicle design which prevails to this day.

4. Montville J., "Wheels for Commerce", in, The American Car, Automobile Quarterly Publications, New York, 1971, pg. 382

Another description of electric trucks, complete with photographs can be found in , Karolovitz R.F., This was Trucking, Superior Publishing Co., Seattle, 1966
5. Epstein R., The Automobile Industry, A.W. Shaw Co., New York, 1928, pg. 132

Some of these early companies were the Cunningham steam truck of Boston, the Riker electric of New York, and the Herschmann of Brooklyn.

6. Since no registrations were made for trucks before 1904, it is very difficult to determine the actual number of trucks produced in the early years. By totalling production figures for a number of the larger companies and estimating the rest, a figure of about 100 seems reasonable. Also see Appendix 1 for production figures for other years.
7. Although some firms have been in operation for over seventy years, most, especially before 1910, had very short lives, usually about two years. For a more detailed study of the life of automobile companies, see Epstein R., *op.cit.*
8. McLaughlin C.E., The Growth of American Manufacturing Areas, University of Pittsburgh Press, Pittsburgh, Pennsylvania, 1938, pg. 267
9. *op.cit.*, pg. 56
10. This has been taken from a 1926 article on the spread of innovations in the United States, the source and author of which I cannot find.
11. Glover J.C., and Lagai R.L., *op.cit.*, pg. 237

12. Piquet J.A., "Scientific Versus Haphazard Plant Location, "
Industrial Management, June, 1925, pg. 330

"... in almost all cases the location of the plant was in the founder's home town. That and not industrial factors, was the reason for the location."

13. Almost every source mentions the fact that truck companies often developed from the expansion of existing firms, such as wagon builders and machinery manufacturers. See the study of one particular company, Montville J., Mack, Haessner Publications, New Jersey, 1973

14. Statistical Abstract of the United States, 1952, pg. 178

15. Rosenberg N., Technological Change in the Machine Tool Industry, 1840-1910, Journal of Economic History, 1963. pp. 414-443

16. Some of these towns were the industrial centers of ,
 Worchester, Hartford, Springfield, and New Haven.

17. Karolovitz R.F., op.cit., pg. 74

White originally made sewing machines, Pope made bicycles, Mack made wagons, Alco made locomotives, and Pierce made bicycles and bird cages.

18. Estall R.C. and Buchanan R.D., Industrial Activity and Economic Geography, Hutchinson and Co., London, 1973, pg. 205
19. Epstein R.C., op.cit., pg.50
20. op.cit., pg.51
21. Rosenberg N., op.cit., pg.444
22. Karlovitz R.F., op.cit., pg.119
23. Rosenberg N., op.cit., pg.437
24. Karlovitz R.F., op.cit., pg.69

This was written by a British journalist in 1912 after a trip to the United States.

25. Karlovitz R.F., op.cit., pg.70
26. Karlovitz R. F., op.cit., pg.21
27. op.cit. pg.22
28. Rojers B., The Commercial Truck Versus the Horse, Scientific American, 1909, pg.43
29. Karlovitz R.F., op.cit., pg.22

The great weight of the storage batteries prevented the electric truck from being used on unsurfaced roads, especially in wet weather.

30. Montville J., op.cit.,1973,pg.12

31. op.cit.,pg.12

32. op.cit.,pg.12

The first vehicles produced by Mack were actually sight seeing buses, but after they moved to Allentown the company expanded into the production of other commercial vehicles and components. One of the reasons the company moved to Allentown was because one of the Mack brothers had a textile company there and was able to persuade the other brothers to move there as well.

33. This can be better illustrated in Fig. which shows the relative decline of the Northeast compared to the Midwest.

34. The Northeast continued to be dominant in the production of electric trucks for the urban market which existed to some degree even in the 1970's.

35. By the 1920's when motor vehicle production began to increase tremendously, this became a more important factor. Large companies such as Ford had their own steel mills and after 1924 other steel mills began to locate in the Detroit and Chicago areas when the Pittsburgh Plus system was abolished. The Great Lakes system became important because most of the iron ore was being shipped from the Mesabi Range in northern Minnesota.

36. Pounds N., The Geography of Iron and Steel,
Hutchinson University Press, London, 1963, pg. 124
After 1924 the Pittsburgh Plus pricing system was
abolished.
37. This was mentioned in a brochure printed by Diamond
Reo trucks of Chicago in 1910. It compares the costs
of shipping sheet steel to Chicago from Pittsburgh,
with the costs of shipping finished products from
Pittsburgh.
38. Wagoner H.D., The U.S. Machine Tool Industry From
1900 to 1950, M.I.T. Press, Cambridge, Mass., 1966, pg. 43
39. Doolittle J.R., The Romance of the Automobile Industry,
Klebold Press, New York, 1916, pg. 281
40. Wik R.M., Henry Ford and Grass Roots America, University
of Michigan Press, Ann Arbor, 1972, pg. 20
"...gasoline engines reached American farms before
the automobile...in 1900...no advertisements for
automobiles but numerous ads for stationary gasoline
engines..."
41. Miller E.W., Manufacturing, Penn State University Press,
1977, pg. 219
" A growing lake freighter business resulted in the
lower Great Lakes states in becoming important producers
of gasoline powered marine engines."

42. There does not seem to be any actual proof of this, but it is mentioned in numerous articles. i.e.,

"Bankers in the East were less willing to furnish short term credit...than were the more progressive middle west bankers." Hurley(1959)

" Few conservative Eastern bankers were willing to invest in the motor vehicle industry..." Epstein(1928)

" Financiers in the East were less willing to provide risk capital to an infant industry." Miller(1977)

43. See footnote 42

44. Ford was aided at first by a coal merchant, but most of its subsequent expansion was financed by profits. For more information on Ford see Epstein R.C., (1928)

45. Motor Vehicle Manufacturers Association, Facts and Figures, Detroit, Michigan, 1977, pg.9

46. op.cit., pg.9

This source gives production figures for passenger cars from 1900 and from 1904 for trucks.

47. Hurley N.P., The Automotive Industry: A Study in Industrial Location, Land Economics, February, 1959, pg. 1

48. A good account of the automobile industry and its early pioneers is given in, Doolittle J.R., The Romance of the Automobile Industry, 1916
49. Boas C.W., Locational Patterns of American Automobile Assembly Plants, 1895-1958, Economic Geography, July, 1961, pg. 223.

In the whole country there were 461 automobile companies, compared to 88 truck companies. This total for cars was exceeded only in 1914.

50. Epstein R.C., op.cit., pg.
51. Ray G., The Diffusion of New Technology, A Study of Ten Processes in Nine Industries, National Institute Economic Review, 1969, pg. 77

" Studies done in Europe have shown that often areas or countries which are the pioneers of an innovation have slower speeds of diffusion. They often suffered from teething problems associated with a new technique. "

CHAPTER FOURSmall Scale Production, 1909-1918

One of the main problems facing the truck industry in this experimental period was the actual building of the truck. A great variety of chassis designs and engine types were tried, often with rather limited success. Some improvement began to become evident near the end of this experimental period as at least two significant changes took place in the industry. One of these was the increasing superiority of the gasoline engine. The other was an important locational change as the Midwest became the dominant truck producing region.

The truck industry in 1909 was still in an infant stage, especially when compared to the booming automobile industry. By 1909, over 350,000 passenger cars had been built in the United States and Canada.¹ In comparison, only about 6000 trucks had been built in the same time period from 1895 to 1909.² Trucks actually accounted for less than 2% of all motor vehicles produced in North America. The first year in which there was any significant truck production was 1909, when over 3300 trucks were built. This was shared by 88 different companies, resulting in an average of only 36 trucks per firm. Since some truck producers were building over 500 vehicles per year by 1909, the majority of the firms had to be very small, some making only two or three trucks each year.³ In many cases these firms were not able to produce more than a few trucks before succumbing to the problems of production and increasing competition.

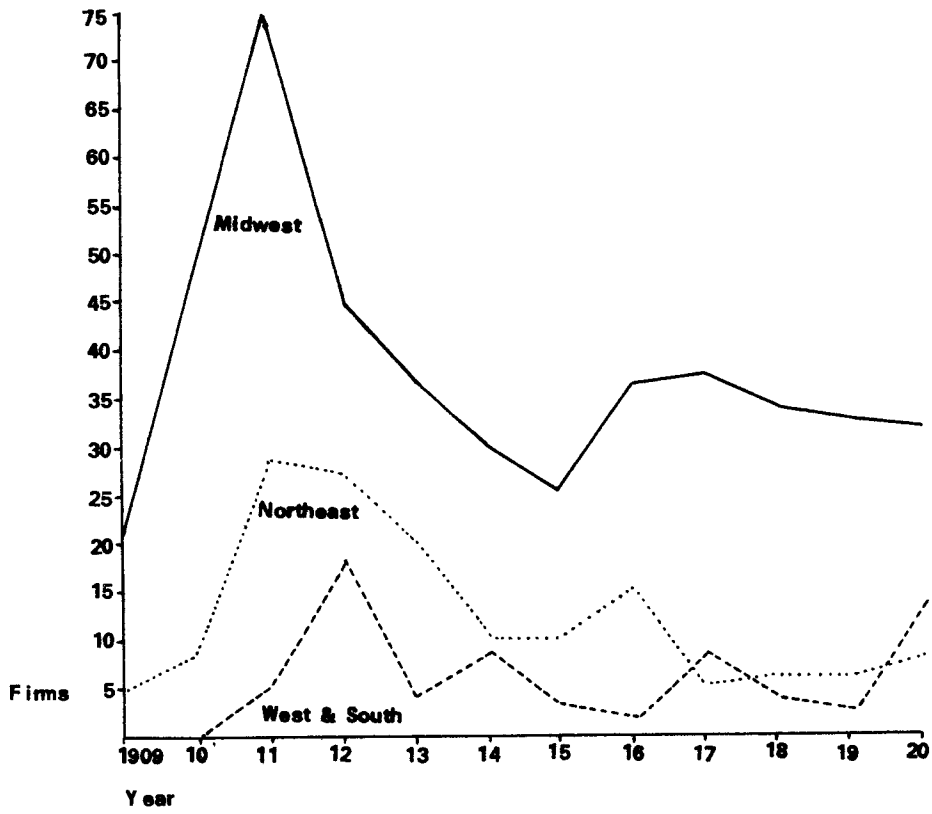


Figure 5 TRUCK INDUSTRY ENTRIES, 1909-1921

Source; See note to Map 5

This increase in production which occurred mainly between 1908 and 1909, was accomplished by an increase of only eight new truck builders. The number of firms increased by only 20%, but total production rose by over 400%. There was clearly a trend towards larger firms. Most of these were ones which had been established in the very early years of the industry, such as Mack and White, both of which were started in 1900. They were well financed, they had good production facilities, and they were already well known as makers of reliable, and dependable vehicles. At a time when the potential truck buyer was faced with almost a hundred makes to choose from, this latter quality was extremely important.

While some firms were becoming well established, there were many more attempting to enter the industry. Up to 1909 the entries and exits of truck firms differed very little in numbers, and as a result the total number of companies increased quite slowly. (Fig. 5) This situation of slow growth began to change quite suddenly in 1910, when 57 new firms entered the industry. Since exits were only 10 in number, the net result was an increase of 47 truck companies. A year later, the interest really began in the industry as 115 new companies were established.⁴ A comparison of entries and exits during this period illustrates the great differences between them. (Fig. 5) Although many of these new firms were small, and many would not have a very long life, they did create some very dramatic changes in the size and distribution of the industry.

As the number of entries increased so did the total number of truck companies. An all-time peak was reached in 1913 when there were 285 truck firms in operation.⁵ The number of truck companies was to remain high for many years as over 200 operated each year from 1911 to 1923. Few companies, however, managed to survive for the whole of this period, as exits as well as entries remained quite high. (See appendix B)

This sudden jump in the number of truck producers after 1909 also caused a great increase in the number of trucks produced. Although production had increased rather slowly before 1909, it was a different situation in the few years that followed. By 1913 there were so many truck companies that a surplus of trucks was being produced. The market was not growing as fast as the trucks were being built so between 1912 and 1914 there was little change in production. (Table 4) By 1914, however, new markets were opened up and production increased rapidly. In fact it continued to rise each year until it reached a record of 321,700 in 1920. (Table 4)

Table 4 : Truck Production and the Number of Companies

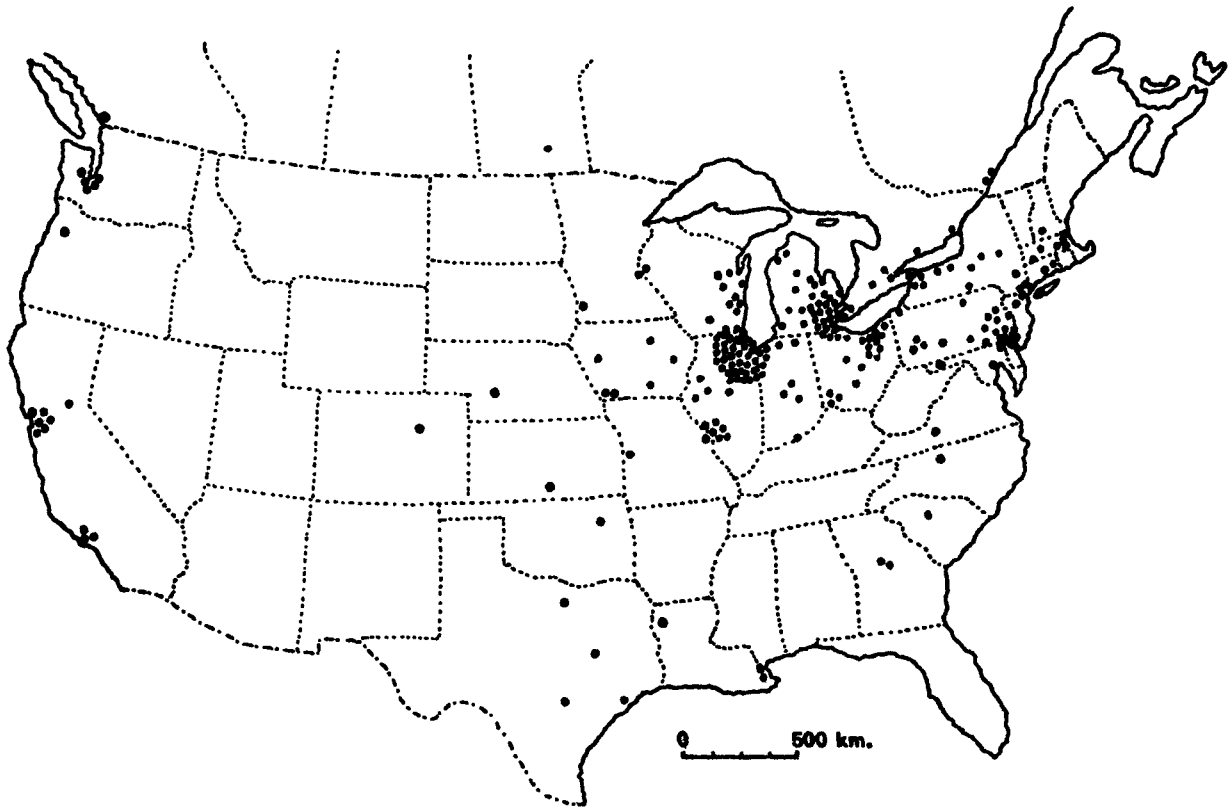
Year	Companies	Production
1909	88	3300
1911	227	10600
1913	285	24000
1915	253	74000
1917	237	128000
1920	259	321700

Source: Statistical Abstract of the United States, 1970

The rapid increase in the output of the truck industry resulted in a number of locational changes. There were quite distinct preferences as to where the new truck companies were locating. Of the 115 new firms entering the industry in 1911, 73 located in the Midwest, 26 in the Northeast, 10 elsewhere in the United States, and 6 in Canada, most of them in Southern Ontario.⁶ Comparison of the entries into the industry by region clearly illustrates the dominance of the American Midwest, not only in 1911, but in every year from 1909 to 1920. (Fig. 5)

This popularity of the Midwest had already started in 1905 when the Northeast first began to lose some of its dominance. By comparing various maps of truck company locations from 1900 to 1920, one can see the westward shift to the Midwestern region. (Maps 5 , 8 , and 9) They also illustrate the spread of the truck industry, although on a rather small scale, to other parts of North America. New companies were established in almost every populated area. Scores of producers were operating in rather remote areas such as the Prairies, the Southern states, and on the West coast. In both the United States and Canada, truck firms were set up almost everywhere there was a market for even one truck.

Although many small towns had their local truck company, most of the truck producers were locating in the larger cities. Cleveland, Detroit, and especially Chicago became important locations for truck companies. It should be noted that these cities were also major centers for the automotive and parts industries.⁷



Map 9

TRUCK COMPANY LOCATIONS, 1920

Source; See note to Map 5

In this period after 1909, there were really three major locational changes. One was the shift of the whole industry's focal point to the Midwest. Another was the dispersion of many of the truck companies, especially the very small ones, to almost every part of North America. The third was the change in the roles and relative importance of the three or four major truck producing cities. These changes were caused by a variety of factors, some of which were local, and some which affected the whole industry and even the whole economy. In order to understand the spatial changes which took place, it is necessary to examine, in some detail, the numerous factors which helped to cause them.

The Spatial Changes-An Explanation

In the experimental period up to 1909, there had been numerous factors which favoured the growth of the truck industry. This growth, however, did not materialize until after 1910. Although entry into the industry was easy, and the related automobile industry was very successful, truck companies, at least those of any significant size were very slow to develop.

The main reason for this lag in growth was the fact that the truck had to compete with the horse as a form of commercial transport and thus a large market was not easily created.⁸ The truck industry also had the problem of trying to sell a product which was not always reliable and one which was being produced with little standardization. As a result, each truck company's product was different and the buyer was faced with a bewildering assortment of vehicles, a fact which often made him shy away from purchasing a truck.

The many truck companies which began operations after 1909 bought most of their parts from suppliers which sold parts to the whole truck industry. As a result there was an increasing amount of standardization. In addition to parts there were changes in truck designs. The great variety of chassis designs and body types were reduced to one basic design as the American style of truck was developed.⁹ With the constantly improving gasoline engine being used for power the truck was becoming much more flexible in its range of operations, as well as being more reliable and much easier to repair. Such improvements did not go unnoticed by the potential truck buyers and as a result the truck was gaining quite rapid acceptance by 1914.

As the truck and its method of production improved, so did the price, at least for the buyer. The use of standardized parts, higher volumes of production, and more mechanized assembly lines, all helped to lower the price of the truck.¹⁰ Between 1904 and 1921 truck prices dropped by over 60% for light trucks and over 70% for the heavier models. (Table 5) The truck industry was learning many of the production methods being used by the passenger car makers such as Ford, which was able to produce a very simple, yet reliable and versatile vehicle at a very low price. A low price for trucks was a definite advantage in the truck's battle with the horse as the most popular means of commercial as well as agricultural transport.

Table 5 : Truck Prices,1904-1921

Year	Light Trucks (less than 1 ton)	Heavy Trucks (greater than 1 ton)
1904	\$1810	\$3070
1909	\$1030	\$2320
1914	\$1080	\$1780
1919	\$ 914	\$1090
1921	\$ 707	\$ 957

Source: Fabricant,S., The Output of Manufacturing Industries,
1899-1937,National Bureau of Economic Research,New
York,1940,pg.580

This drop in truck prices made the truck very attractive to the potential truck buyers,especially on the farms where real income had been increasing substantially after 1910.¹¹ The new popularity of the truck as well as the passenger car prompted one journalist to write;

"...the mortgage on the farm has been replaced by the telephone,the tractor,and the motor vehicle." ¹²

The growing acceptance of the truck in agricultural areas was to be extremely important to the truck industry's success. Since the rural markets required a light truck,which was the easiest,and cheapest to build,they attracted many small firms which assembled trucks for the local markets. Until these new markets were opened up,the trucks were limited to the larger urban markets where heavy trucks were preferred over the light ones for commercial goods transport.

With the development of the light truck and its subsequent success in the marketplace, trucks firms could locate in many of the more isolated areas away from the industrial core of the Midwest. Standardized parts were easily available from the major cities and in many cases truck and automobile parts were interchangeable. Less skilled labour was needed to assemble the simple trucks and companies were not forced to locate in areas with a suitable highly skilled labour force. In most cases the small local producer was favoured by potential buyers because it could offer better service and was often better tuned to the needs of its particular market. The fact that many had already been making other products such as engines or tractors gave them an advantage since they had a loyal market in the immediate area.¹³ The change in the type of truck being produced gave the truck companies more markets and these markets in turn created a greater demand for trucks.

Although the ability to sell and make trucks in the rural areas was a major step forward for the truck industry, the most important markets were still in the large cities. Problems with the horse such as high operating costs, health problems, and the great waste of valuable urban land for stables and barns, gradually began to outweigh the advantages of familiarity, low purchase price, and tradition. As a result there was increased interest in the use of trucks for inter and intra urban transportation.

This interest in the truck did not necessarily mean that production would increase proportionately. Actually production increased very slowly in the period between 1912 and 1914.¹³ Much more work was needed if the truck was to become fully accepted by commerce and industry. There were still too many skeptics who insisted on using the old but proven methods.

During this slow growth period the number of truck companies began to decline, although very slightly. Exits were increasing and entries decreasing as many firms found out that the truck market had not yet begun a boom period similar to that which had taken place in the automobile industry. Because the volume of production failed to rise with the increase in the number of producers, the result was that most companies were very small, and usually unable to develop competitive products.¹⁴ Many firms were in financial difficulty even before they made their first truck, and would probably not have survived even in a healthy market. Even the well established producers were, however, having problems, since the market demand did not respond to the number of trucks being produced. New markets were needed if the industry was to expand.

These new markets did eventually open up, but the main cause was not in North America. In 1914 the First World War began in Europe and its needs were to have a great amount of influence on the truck industry as well as the whole world economy.

One of the greatest needs of the war was transportation. The horses that were available in Europe and later North America were not enough to move the vast amount of men and materials. There was an even greater shortage of trucks since they had not yet been adopted by many armed forces. The truck companies in Europe were unable to produce the numbers of trucks that were needed so the Allied armies turned to the United States and Canada. At first only a few trucks were shipped to Europe, but by 1917, when the United States entered the war, most of the North American production was for the various war needs.¹⁵ The truck quickly proved to be much superior to the horse, in the battlefield, and also because it could be produced very quickly. The truck did not have to grow a few years before it became useful as was the case with the horse.

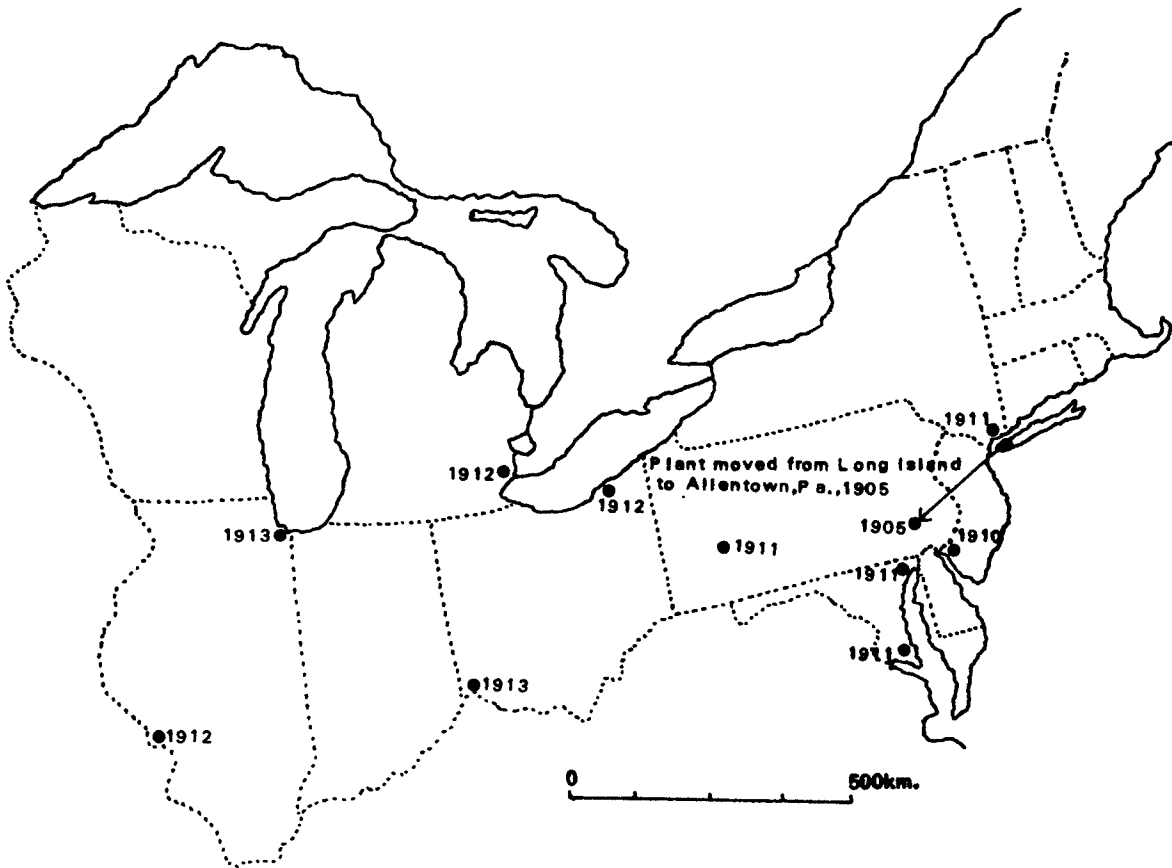
The tremendous demand for vehicles after 1914 was timed almost perfectly for the truck industry. It had just undergone a period of expansion and many firms had much of their newly built capacity sitting idle. The industry was thus able to respond very quickly to the new market created by the war. Production rose by almost 1000%, from only 24,900 in 1914 to 227,200 in 1918.¹⁶ This great increase was accomplished by the existing firms from 1914, as there was a sudden decrease in the number of new firms entering the industry. Some companies found other businesses more lucrative, while others were forced to leave truck production because of a shortage of parts. This was especially true in Canada.

While the war provided much of the market for trucks, there was also a growing market in North America. Many industries had expanded to produce war goods and they needed more transportation. They were, however, faced with a problem. Many of the horses were already being used by the armed forces and to raise new ones would take up to three years.¹⁷ The only alternative for many businesses was to switch to trucks. This had the effect of greatly increasing the demand for trucks in a very short period of time. In most cases the switch was permanent as few businesses were willing to start using horses again when the war was over.

There was then great optimism in the offices of the truck companies when the war ended.¹⁸ The truck had finally proven itself to be far superior to the horse, and was being widely accepted as the best means of road transport. In addition there was a large domestic market as trucks were being purchased by commerce, industry, and agriculture in increasing numbers. After the war, these factors helped to increase production to over 320,000 in 1920.¹⁹ The number of firms also began to rise as entries increased in response to the improving fortunes of the industry. Exits from the industry reached 21 in 1919, which was the lowest since 1910. Entries were much higher than exits as they maintained their high level by reaching 37 in 1919. As a result the number of truck producers rose to 239, after a slight decline in the late years of the war.

In addition to the many new companies that were entering the industry there was some expansion by the relatively old, and established ones. One of these companies was Mack, which had earlier moved to Pennsylvania from New York. It expanded some of its production facilities, but its main thrust was in the expansion of its dealer network.²⁰ In 1910 almost all of its dealers were concentrated in the Northeast, but by 1913 it had set up new dealers in the major Midwestern cities such as Chicago, St. Louis, and Cincinnati. (Map 10) This was a definite sign of maturation as the company began to change from a small local producer to a large one serving a regional and eventually a national market.

Other established truck companies also expanded their dealer networks as they attempted to increase their market coverage. The growing competition made it necessary for many firms to expand away from their local markets. In some of the larger cities a rather small market was being fought for by growing numbers of truck producers. In the large cities as well as in the smaller ones, the truck companies not only had to compete with each others dealers, but in many cases there were local truck builders which often had an advantage in the market. This was particularly true in the rural areas which were some distance away from the major areas of influence of the larger truck companies. In some other instances the local producers were at a disadvantage when faced with the prospect of competing with a superior product from the older, well established companies which had set up new dealers in their local market areas.



Map 10;

MACK TRUCK DEALERS 1910-1913

Source; Montville J., Mack, 1974

Although most of this activity of establishing new truck companies and expanding existing ones was going on all over North America, most of it was in the American Midwest. In most years between 1910 and 1920, nearly 80% of all new firms were locating in the Midwest. (Fig. 5) The result was that by 1913 there were over 200 truck producers just in the Midwestern region.²¹ The large cities such as Detroit and Chicago were the most popular locations, but there was also a considerable amount of dispersion into the rest of the region. New firms were being started in some of the more remote areas such as Wisconsin and Northern Michigan, well away from the major industrial centers.

This influx of new firms, as well as the expansion of the many existing firms soon made the Midwest the major motor vehicle producing area of North America. (Table 6)

Table 6 : Share of Value Added in the Motor Vehicle Industry

	1909	1914	1919
Michigan	38.8%	62.9%	70.6%
Ohio	15.6%	13.5%	10.5%
Indiana	9.5%	4.6%	4.5%
New York	12.4%	6.7%	4.0%

Source; United States, Census of Manufacturers,
1923, pg. 265

Although the share of value added illustrates the situation for the whole motor vehicle industry, it is safe to assume that the truck industry followed the same pattern. Since most of the large truck producers were located in the Midwest, and since the greatest share of production was also concentrated there there was a definite centralization of the industry. In this region there were a number of large cities which dominated the industry but each seemed to play a different role and each also had unequal amounts of success.

Since the cities were the main markets for trucks and since most of the parts suppliers were also located in the cities it comes as no surprise that truck companies began quite early to concentrate in the larger cities. In 1910 there were four major centers which dominated the truck industry. Detroit, Chicago, New York, and surprisingly Milwaukee, all had approximately equal numbers of truck companies. (Table 7) By 1920 there were, however some major locational changes with respect to the importance of each of the centers. Although in 1910 the truck companies had not preferred any particular city, by 1920 they were locating primarily in Detroit. These changes did little to reduce the collective dominance of the major cities, as by 1920 they still accounted for over 30% of all truck firms in North America. This was true even though there had been a tremendous amount of expansion into other parts of the country.

Table 7 : Truck Companies by City

	New York	Chicago	Detroit	Milwaukee
1900	11	1	1	0
1905	15	3	4	4
1910	14	11	13	10
1915	23	27	21	7
1920	14	40	23	5

Source; Compiled from various sources, but mainly
the listing of truck manufacturers in ,
The American Car, Automobile Quarterly,
New York, 1971, pp. 408-441

Because these changes in the location preferences of the truck companies reflected the various factors affecting the industry in the 1910 to 1920 period it is important to better understand what these factors were. There were some very definite reasons why one city was preferred over another and these caused the industry to develop certain locational patterns.

The Truck Industry in the Cities

When the industry initially concentrated in the Northeast the dominant city was New York. In 1900 that city had about 55% of all truck companies in North America. By 1920 its share was reduced to only 5%.²² This drop in the relative share of New York occurred even though the absolute number of firms increased slightly from 11 to 14. Actually even in its peak year, New York had 25 truck companies but only 10% of the total industry. The main reason for this was the much faster growth of the industry in the areas outside New York, especially in the Midwest.

This relative decline was not limited to the city of New York. The whole Northeastern region had been gradually losing its share of both the truck and automobile industries. The firms in the Northeast had chosen to concentrate on the electric battery powered truck and were at a serious disadvantage when it failed to match the improvements being made in gasoline engine technology.²³ As the gasoline engine became the most popular power plant for trucks the Northeastern region's truck industry began to change from one which had national markets to one which served only local and regional markets. There was little demand for the types of trucks that the Northeastern companies were noted for, in the rest of the country. Some companies did eventually switch over to the production of gasoline powered trucks but for many the change came too late.

The Midwestern cities such as Detroit, Chicago and Milwaukee, were all of some importance, although often in different years. Of these cities, Milwaukee was perhaps the most unusual since it had many more truck companies than its position or population would suggest. In 1910 there were 10 truck companies in Milwaukee, almost as many as in the larger centers.

One of the reasons for the popularity of Milwaukee was the presence of a large local market for delivery trucks. The city was the major brewing center in the United States and the large number of breweries were among the first major users of trucks.²⁴ Many small firms were established to serve the needs of this local market, but few were able to survive for very long.

The boom in the truck business in Milwaukee was not to last very long. Although the market for trucks continued to increase each year, there was growing competition from truck producers in other cities. The truck companies of Chicago, which was only a short distance away, were able to penetrate the lucrative Milwaukee market. Using the advantages of economies of scale and often a superior product, the larger well established Chicago companies were able to take the market away from the small local producers. These small firms could not compete and were forced to leave the industry. Only a few companies were able to survive as by 1920 there were only 5 truck producers in the Milwaukee area. This was at a time when the industry as a whole was undergoing a great amount of expansion.

In complete contrast to both Milwaukee and New York, the city of Chicago increased its number and share of firms quite dramatically from 1900 to 1920. The peak year was 1920 when there were 40 truck builders in operation in the city. (Table 7) This accounted for about 8% of all truck firms in North America. No other city would ever have such a great concentration of companies. (Map 9)

The truck industry was nothing new to Chicago in the 1920's. It had been one of the first cities in the United States to have a truck company. Even as early as 1896 there was a small truck producer in Chicago.²⁵ Its large size provided a market for even the most unusual vehicles and a great variety of small companies were established after 1900. Few of these were, however, able to survive for very long and it was not until 1910 that the number of companies actually in operation began to increase substantially.²⁶ (Table 7)

Chicago was also an ideal location for a truck company because the city was one of the major transportation centers of the United States. It had many companies which were willing and able to enter into truck production. Numerous truck firms had their origins in tractor builders, engine manufacturers and various types of transportation companies.²⁷

The truck industry in Chicago in 1910 was not yet very large as there were only 10 companies there, about the same as in the other major cities. (Table 7) By 1915 the situation had changed considerably and Chicago had more companies than the long time leader, New York City. In the next five years, as the number of companies in the other cities grew very slowly, or even declined, there was a rapid rise in the companies which preferred to locate in Chicago. As a result there were 40 truck producers in Chicago and even more in the surrounding small towns.

In terms of production, Chicago was also very prominent, as it accounted for about 15% of all trucks produced in North America in 1920. The main emphasis was on the production of the larger trucks which were made in relatively small quantities.²⁸ Very few of the mass producers were located in Chicago, instead it was the prime location for the small specialists which did not use the fast moving assembly lines or very much automation.²⁹

The average production per firm in Chicago was about 1400 trucks per year.³⁰ By comparison the truck companies in Detroit were averaging over 10,000 trucks per year.³¹

The Chicago truck producers grouped together for a variety of reasons. A more skilled labour force was needed to build the larger, more sophisticated trucks and the many transportation oriented companies in Chicago were able to provide the necessary labour pool. There were also a number of other factors favouring agglomeration, such as a well developed infrastructure, many suitable parts suppliers, and local sources of financing. Since many of the parts and skills needed for the production of the heavy duty trucks were quite different from those used in light truck or automobile manufacture, it was to the specialist's advantage to group together in an area where such parts and skills could be made available.³²

While Chicago was attracting the small specialized producers of large trucks, some rather different types of producers were being attracted to Detroit. By 1910 Detroit was already the major automobile producing center in North America.³³ Its share of truck companies and truck production was, however, quite limited. (Table 7) Some of the automobile companies did make trucks but it was on a very limited scale, and it was not until after 1917 that the truck industry really began to become significant in Detroit.³⁴ That was the year in which Ford first began producing trucks.

Ford, as well as a number of others expanded into truck production in the late years of the First World War. The great market that was being opened up in Europe and also in North America was too promising to ignore. Most of these trucks produced by the automobile companies were rather small and were often based on the passenger car, such as the Ford Model T.³⁵ Based on this very popular passenger car the Ford One Ton truck quickly became the best selling truck in North America, and by 1920, Ford had over 40% of the market. (Table 8)

Table 8 : The Ford Truck, 1917-1920

Year	Production	Market Share
1917	7341	5.7%
1918	54564	23.8%
1919	104508	46.7%
1920	132911	41.0%

Source; Compiled from various charts in; Epstein R.C.,

The Automobile Industry, A.W. Shaw Co., New
York, 1928, pg.324

Other companies quickly followed Ford and soon the automobile companies dominated the truck industry. In almost every case, however, they produced only the light to medium sized trucks which could be easily produced on the assembly line and which could make use of many parts common with the automobile. The heavy truck market was too small, and competition was too great in it already for the automobile companies to enter it. They preferred to limit themselves to the smaller trucks for which little change was needed in either production or marketing techniques.

The result of all this expansion by the automobile firms, in addition to the Detroit firms which produced only trucks, was that Detroit became the dominant truck producing city. By 1920 over 65% of all trucks in North America were being made in Detroit.³⁶ This was achieved even though the city only had slightly more than 8% of all the truck companies.³⁷ The larger average size of the Detroit companies and especially the presence of Ford gave it the advantage in total production even though it had a smaller number of companies than Chicago.

By 1920 the truck market was dominated by Detroit and Chicago. The many small makers of the heavy trucks concentrated in Chicago while the fewer in number, but much larger producers of small trucks were centered around Detroit.

Dispersal of the Industry

Up to about 1910 there really had been no truck companies in areas outside the Northeastern or Midwestern regions. There had been some activity in Los Angeles and San Francisco, but production had been very limited.³⁸ In the other areas of the country, such as in the Central West and the South, there had never been any recorded attempts at serious truck production. This same situation was true in Canada, as almost all the truck companies were located in Southern Ontario or Quebec.³⁹ Why there was little dispersion to other areas of the country can be explained by a number of factors.

If one examines an area such as the West Coast, it at first may seem unusual that a truck industry did not develop there. The region was thriving, with a relatively large population even in 1910. (Table 9)

Table 9 : Population Growth in Three U.S. Regions, 1900-1920

	1900	1910	1920	% Change
West Coast	2416	4192	5557	130%
Midwest	15986	18351	21476	34%
Northeast	21046	25867	29661	41%

Source: Statistical Abstract of the United States,
1970, Pg. 234

By applying the average population per truck in 1910, to the population in the West coast region, a potential market of about 200 trucks per year can be determined. This market, although it was rather small, should have supported as many as four or five truck companies, since in 1910 the average production per company was just over 40 trucks per year.⁴⁰

Another reason which should have had some influence in attracting truck companies was the excellent climate in much of the West coast area, especially in California. With no snow or cold winters, truck acceptance should have been very high. The early trucks were much better suited to warm climates, since they usually had few features such as doors, roofs or heaters.⁴¹ The western states were in fact among the first to accept the truck, and this should have attracted some local entrepreneurs to start truck companies. Such was not the case, however, as very few attempts were made at truck production and in 1910 there was only one company making trucks on the West coast. Although the market was there, it was not the only factor that affected the location of a truck company. Other factors especially those relating to the truck itself were to be very significant in determining the spatial distribution of the truck industry away from the main areas of concentration in the Midwest.

One of the most important factors in determining the location of the truck companies, was the building of the truck itself. Since a truck is made up of a large number of parts, the company first has to find a source for those parts. One solution would be to design and build each part by the company itself. This would, however, be very costly and would have resulted in an exceedingly expensive truck. In addition the skilled labour needed to manufacture all the parts often was not available in areas away from the established industrial regions of the Northeast and Midwest.

To solve this problem of high costs, the company could increase production and thus lower the unit costs of the various components. But to increase production, there had to be a corresponding increase in the demand. Before 1910 there was little demand for trucks outside the urban areas so larger companies could not survive in the more isolated areas such as the West coast.

The other choice a company had was to buy all the parts from outside suppliers.⁴² In this manner there was a considerable saving on capital and labour costs. There was, however, a problem with this type of arrangement, since almost all of the major parts suppliers were located in the Midwest, far away from the potential truck company locations in the West or South.

The costs of shipping parts such great distances would have been exorbitantly high, especially if each part was bought from a different supplier. The distances involved also increased the chances of disruptions in the flow of parts. With their low volumes the companies that might have located in the West or South, were faced with high unit costs for the parts, thus raising the prices for trucks.

The result of all these extra costs was that it was actually cheaper to build a truck in the Midwest and ship it fully assembled to a market as distant as the West coast, than to build the truck on the West coast.⁴³ (Table 10)

Table 10 : Production Costs in the West and Midwest, 1910

Midwestern Costs		West Coast Costs	
Parts(East)	\$450	Parts(East)	\$600
Assembly	\$400	Ship to West	\$100
Ship to West	\$100	Assembly	\$400
Dealer	<u>\$ 50</u>	Dealer	<u>\$ 50</u>
Final Price	\$1000	Final Price	\$1150

Source; Compiled from a variety of sources,
See footnote 34, Chapter 4

Some of these restrictions on the spread of the truck industry began to ease after 1910. After the great increases in the number of new truck companies in the 1911-13 period, almost all areas of the country began to have small truck producers. (Map 9) By 1921 there were truck companies in 32 states and 5 provinces, compared to only 16 and 2, respectively in 1909. There was a definite spread of firms into various small centers in the South, such as Texas and into the West coast region cities of Los Angeles, Seattle, and San Francisco.

The growth of the industry in these areas can be at least partially explained by the general factors affecting the industry, such as increased truck acceptance, better roads, and lower prices. There were, however, some other factors which were peculiar to the regions themselves, especially the West coast.

One of these factors was the truck itself. After 1910 the gasoline engine became the dominant power plant for trucks. As a result the truck increased its flexibility and became suitable for a much greater range of markets. One of these new markets was the agricultural one.³⁵ In states such as Kansas, Nebraska, and Iowa the local markets soon attracted truck firms. (Map 9) Many of these new truck producers were really just

extensions of existing companies such as tractor and farm implement manufacturers or even dealers. In fact of the 14 companies operating in these states in 1915, at least 8 had been initially established by some machinery oriented company.³⁶ The most common truck that was produced by these small companies was the light one ton truck. It could be very easily build with widely available standard parts, it was reliable and easily serviced, and it was easily sold to a wide variety of truck users. Until the light truck with a gasoline engine was available, truck companies were not able to locate outside the large cities or the densely populated areas of the Northeast and Midwest.

Over on the West coast the technological developments in the truck also played an important role in determining location. Two of the problems of the early trucks were the high initial cost and the poor performance, especially in the higher weight classes which were dominated by horses.³⁷ Since there was a great variety of designs as well as companies in the higher weight classes, the reliability of the trucks and the availability of parts was often uncertain. Many potential buyers preferred to stick to horses rather than attempt to convert to the unproven trucks. Since the needs of the West required transportation equipment to be heavy duty, it was difficult to sell trucks there as long as they had so many problems with them.

As the truck began to improve it became apparent that it could be far superior to the horse in most applications. The logging markets of the West in states such as Oregon and Washington soon began to buy trucks³⁸. They were, however, faced with a problem in that the Midwestern and Northeastern truck-producers did not make suitable types of trucks for logging. To meet this need some new companies were established in places like Seattle and Portland on the West coast. These local companies were able to charge high enough prices to more than cover the increased costs of production, because no other companies made similar trucks. There was great potential in the logging markets where operators wanted to replace horses which needed so much farmland to feed them, and railroads which were so expensive to build and maintain.³⁹

In other areas on the West coast, different types of markets attracted more truck companies. In Los Angeles and San Francisco there was a growing market for trucks in the urban areas and in the thriving agricultural lands surrounding these cities. Some of this increased demand was met by shipping assembled trucks from the Midwest.⁴⁰ In other cases the Midwestern companies set up subsidiary plants in the West, since it was cheaper to ship the parts than the fully assembled truck.⁴¹ There was a problem, however, as these Midwestern trucks were not always suited to Western conditions.

In response to the needs of this local market, new truck companies were established to build special "Western" trucks. Out of the 12 truck plants in California in 1920, 7 produced trucks which were specially designed for Western market conditions.⁴²

These trucks were aided by some changes in the prices of parts after 1910. The booming automobile industry created many large parts producers in the Midwest.⁴³ As the truck industry also began to expand production, parts production increased and through economies of scale the prices decreased. It soon became economical to purchase the parts in the Midwest and assemble them at the market. This was particularly true when labour costs for motor vehicle assembly increased..⁴⁴

The automobile companies also saw the potential in the Western market. As their production increased they started to make their own parts in large Midwestern factories. These could be shipped very cheaply to assembly plants in places such as Georgia and California where the local market was quite large.⁴⁵

By 1920, the truck industry had reached its most dispersed state. Almost every populated area of the United States and Canada had some truck companies. Most were small firms producing trucks for the local market. They were able to survive at least for a few years because the larger firms did not produce suitable trucks. By 1920 the situation had begun to change, as the automobile companies expanded into truck production. They could make the popular light trucks at a much lower cost and were easily able to sell at lower prices than the small local producers.

The other major spatial change occurred in the large cities. Whereas in 1910 no one city dominated, in 1920, Detroit and Chicago were by far the most popular truck producing centers. Detroit had most of the large producers of small trucks while Chicago was the favoured location for the small producers of large trucks. These small companies in Chicago as well as in other parts of North America were beginning to face even more competition from the mass producers in Detroit. By 1920 many small firms were already being forced out of the industry because of changes in the methods of truck production. This trend would develop further after 1920 and dramatically affect the pattern and structure of the whole truck industry.

Notes For Chapter Four

1. Statistical Abstract of the United States, 1970, pg. 716
2. Epstein R.C., The Automobile Industry, 1928, pg. 314
3. Doolittle J.R., The Romance of the Automobile Industry, 1916, pg. 187
4. See footnote for Fig. 5
5. See footnote for Fig. 5
6. This was determined by mapping all the truck company locations from 1900 to the present.
7. There is an excellent and rarely studied section on the early parts suppliers in Doolittle, 1916
8. Flink J.J., America Adopts the Automobile, op.cit., pg. 89

"The reason for the lag in the commercial adoption of the motor vehicle was not that the motor truck seemed less economical than the horse and wagon; rather, large scale adoption was necessary to realize any appreciable economies, and large scale adoption involved substantial commitment to an innovation not yet perfected and familiar; with the attendant problem of securing the competent drivers and mechanics upon whom any efficient and economical operation of a motorized system in large part depended."

9. Doolittle J.R., op.cit., Pg.366

The American style of truck was one which had the engine under the seat. The most common European design had the engine in the front under a hood.

10. Doolittle J.R., op.cit., pg.141

Ford's costs per vehicle were reduced from \$8.75 in 1912 to \$1.25 in 1914 by using the assembly line. Time of assembly decreased from 14 hours to only 3 hours.

11. Wik R.M., Henry Ford and Grass Roots America, University of Michigan Press, Ann Arbour, 1972, pg.21

The price index for farm produce rose 52% between 1900 and 1910.

12. Epstein R.C., op.cit., pg.37

13. _____, pg.314

14. Montville J., Wheels for Commerce: A History of American Motor Trucks, in, The American Car, Automobile Quarterly Publications, New York, 1971, pg.391

15. _____, pg.397

16. Epstein R.C., op.cit., pg.314

17. Casson H.N., Hutchinson R.W., and Ellis L.W., Horse, Truck And Tractor, F.G. Browne and Co., Chicago, 1913, pg.136

18. Epstein R.C., op.cit., pg.355

Automobile stocks rose from \$71.32 to \$185.15 between 1917 and 1919 compared to a rise from \$90 to \$100 for all other industrials.

19. Epstein R.C., op.cit.,pg.314
20. Montville J.B., Mack, Haessner Publishing,Newfoundland,
New Jersey,1973,pg.27 and 42
21. Compiled from the listing of truck manufacturers,see footnote
4 Chapter 3
22. See the footnote to Fig. 5 in Chapter 3 .
23. Karolovitz R.L.,This Was Trucking, Superior Publishing Co.,
Seattle,1966, pg. 21
24. _____,op.cit.,pg.87
25. Montville J., op.cit.,1971, pg.382
26. See footnote to Fig. 5 Chapter 3
27. See footnote 45,Chapter 3

28. This was determined by examining the type of trucks
produced by the companies in Chicago. Although most of
them manufactured or assembled all kinds of trucks,the
emphasis was on heavy models.
29. Karolovitz,R.L.,op.cit.,pg.119

The Diamond T company was a major one in Chicago. By 1920
it had dealers in most parts of the United States.From
old Diamond T company literature, year unknown.
30. This was calculated from a variety of sources including
Epstein R.C., and Karolovitz R.L. See also footnote to
Fig. 5 Chapter 3 .

31. See footnote 30,Chapter 3
32. Hurley N.P.,The Automobile Industry: A Study in Industrial Location,Land Economics, Feb.1959,pg.3
33. This was determined from the various maps of the truck company locations between 1900 and the present.
34. Boas C.W., Locational Patterns of the Automobile Assembly Plants,1895-1958, Economic Geography, July 1961,pg. 223
35. Epstein R.C., op.cit., pg. 196
 Ford's one ton truck introduced in 1917 was easily produced on the assembly line since it used many of the components of the Model T automobile
36. See footnote 30,Chapter 3
37. op.cit.
38. Ford Motor Co. literature,1955
 Some Ford trucks were built in Los Angeles in 1920
39. Byrnes T., The Automobile Industry in Ontario, MA Thesis University of Toronto,1951,pg.20
40. Determined by dividing production by the number of companies, see appendix A and B.
41. Flink J.J.,op.cit., pg.30
 "Had climate been a major determinant,the seasonal limitations upon the use of the motor vehicle imposed by the combination of relatively severe northern winters,and the prevelant use of the open motor vehicle of the period

should have resulted in comparatively more widespread adoption of the motor vehicle away from the northern states, ...the opposite of what in fact occurred."

42. Fabricant S., The Output of Manufacturing Industries, National Bureau of Economic Research, New York, 1940, pg.307
43. Ford Company Literature, 1955, pg.7
44. Wik R.M., Henry Ford and Grass Roots America, University of Michigan Press, Ann Arbor, 1972, pg.31
 See also Epstein R.C., op.cit., pg.257
 Truck registrations were, 24% in towns of under 1000 and 42% were in towns of under 5000. Of all trucks, 20% were on farms.
45. From the names of the various companies one can determine the original product it produced. e.g.
 Kuhn Tractor Co.
 Lamson Truck and Tractor Co.
 Muskegon Engine Co.
 Universal Machinery Co.
46. Doolittle J.R., op.cit., pg.312
47. Montville J., op.cit., pg.402
 See also numerous photographs of western logging trucks in, Karolovitz R.L., This Was Trucking, 1966

48. Karolovitz R.L.,op.cit.,pg.89

49. See footnote 38,Chapter 4

50. op.cit.

51. This was determined by the types of trucks which were
being produced by the Western companies

52. Doolittle J.R.,op.cit. pg.276

53. Ford Company literature,1955

54. See footnote 38,Chapter 3

CHAPTER FIVELarge Scale Production 1918-1945

After the great boom period of 1910 to 1913, the truck industry existed, in one form or another, in almost every settled region of North America. The number of companies had risen sharply from only 88 in 1909 to a high of 285 in 1913.¹ In fact after 1911 there were over 200 truck companies in operation every year until 1923.² Although the failure rate was high and few firms were ever able to achieve large scale production, there was always a large number of hopeful firms entering the industry each year. As the popularity of the truck increased, so did the number of companies trying to gain a share of the growing market. (Fig. 6)

The small size of the new entrants into the industry prevented total production from increasing in proportion to the number of companies. Compared to the automobile industry total truck production remained very low. In 1914 trucks accounted for only 4% of all motor vehicle production.³ It was only in the later years of the First World War that truck production began to increase substantially. By 1918 truck production was well over 200,000 units per year.⁴ Much of this increase was caused by a growing market at home and large orders for the armed forces in Europe. This in turn increased the number of producers and caused the auto industry to enter truck production.

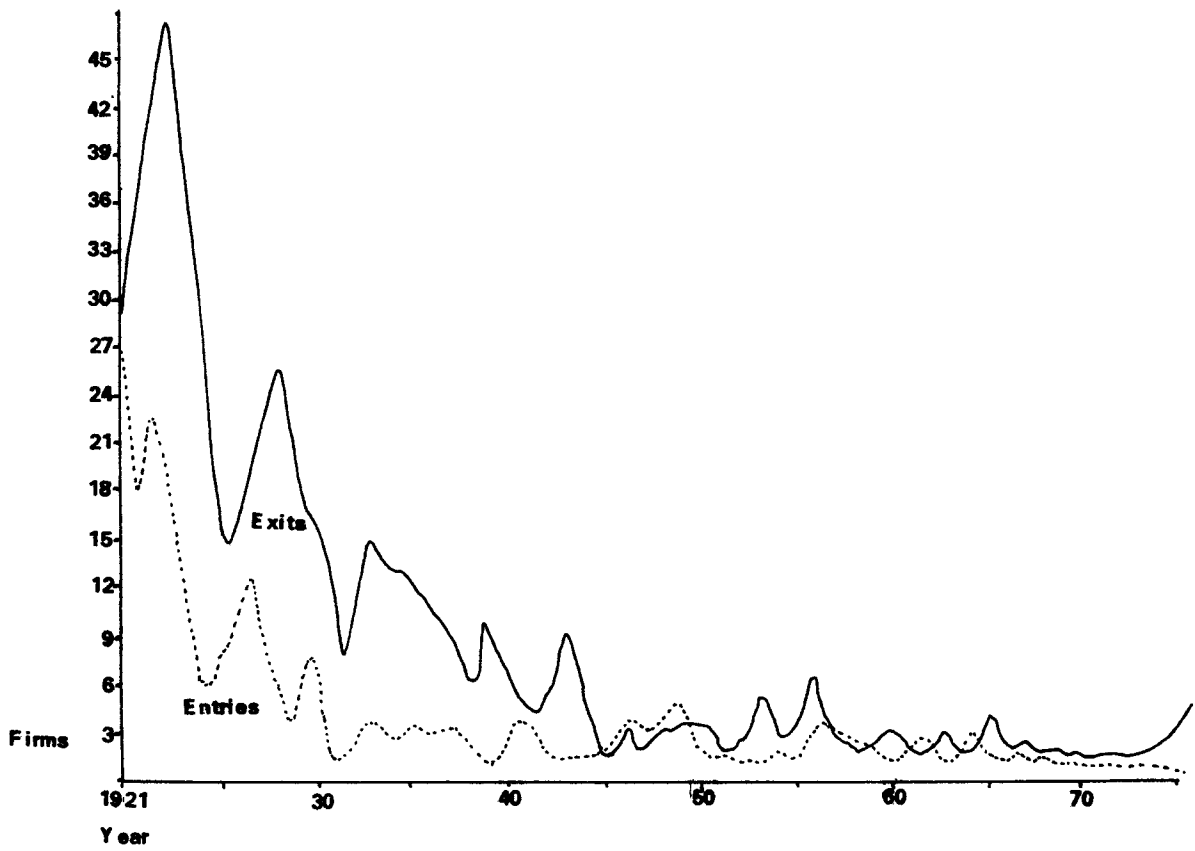


Figure 6

ENTRIES AND EXITS OF TRUCK COMPANIES 1921-1977

Source; See note to Map 4.

In addition to the changes that were occurring throughout the country, there were some shifts in the importance and roles played by the major cities, such as Detroit, New York and Chicago. These changes had already begun in the period before 1920 as Detroit began to become the major truck producing city. The Detroit based auto companies, which had expanded into truck production were able to dominate the industry by mass producing trucks. While Detroit was assuming its dominant role, Chicago was rapidly losing its share of companies. The truck companies that did stay in Chicago were ones which specialized and built only the larger trucks.

New York City was also affected by the growth of the large companies in Detroit. The industry there also specialized but not in the large trucks. The trucks that continued to be built in New York were the very small delivery trucks which were often powered by electric batteries, and were designed for the local market.

These changes in the cities as well as in the country in general were the result of growing acceptance of the truck, and increased production by the large mass producers which were able to make trucks more cheaply than the small companies.

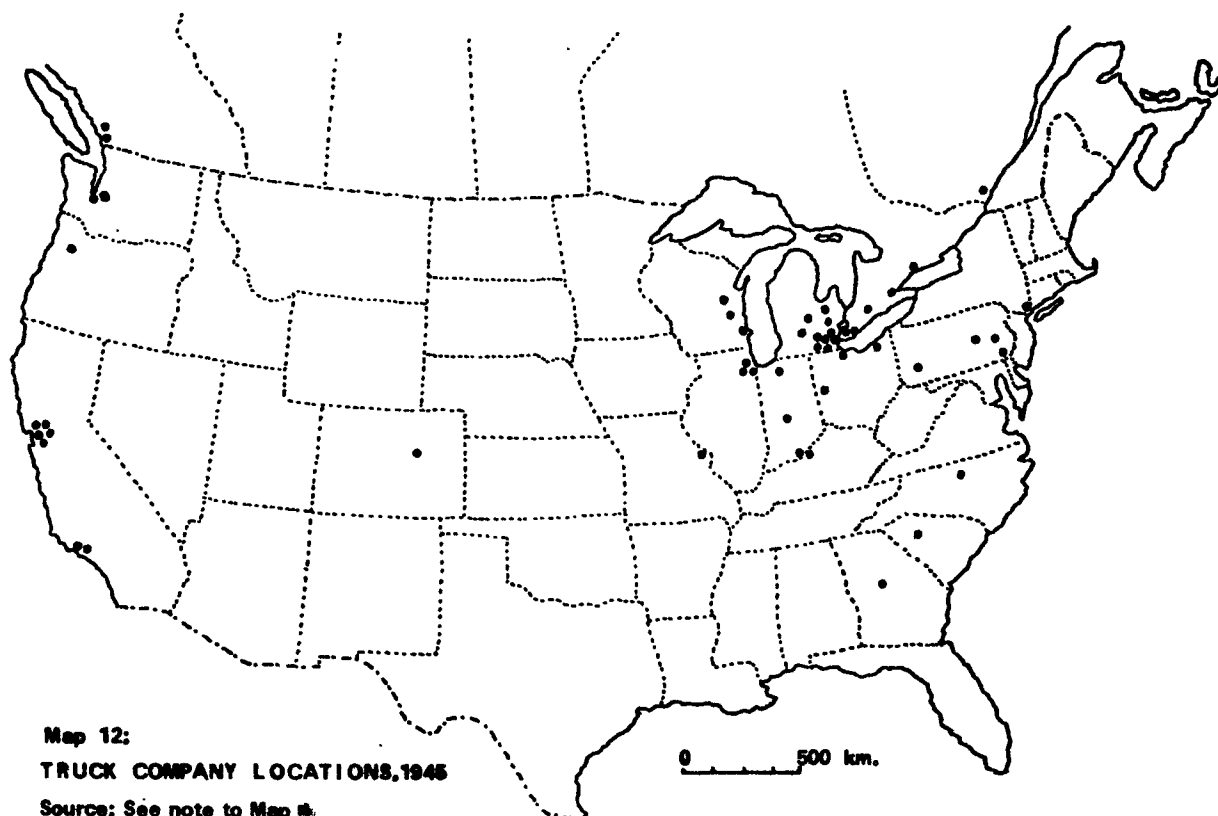
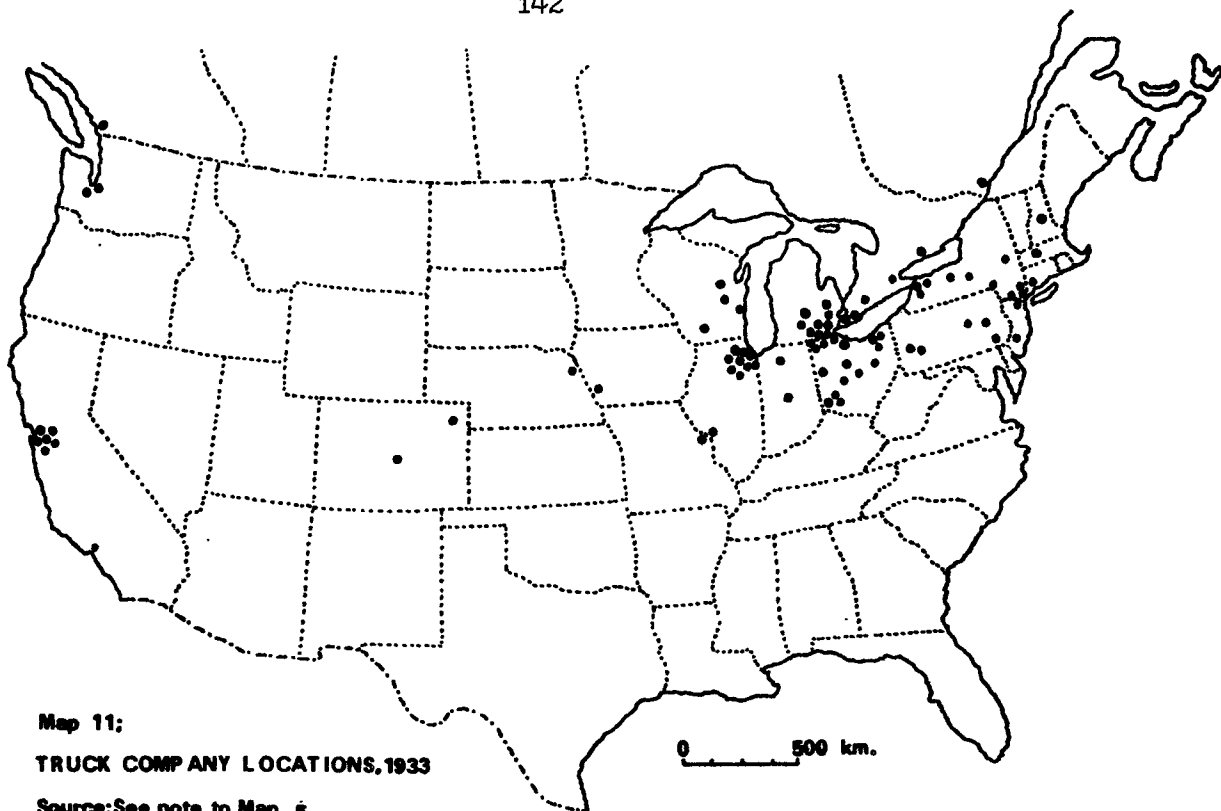
Table 11 : The Decline of Truck Companies, 1921-1945

Year	Midwest	Northeast	West	South
1921	129	72	17	16
1933	45	12	10	8
1945	25	8	8	5

Source: See footnote to Map. 5

Although the Midwest lost the most companies, it still remained dominant because the other regions had been greatly reduced in importance. In addition the size of the companies in the Midwest increased, unlike the situation in some other areas. The Northeast which had been able to maintain some importance up to 1920 was by 1945 only known as an area for the manufacture of very specialized vehicles such as electric delivery trucks, and on a very small scale. The region that decreased the least was the West coast where the relatively new firms were able to survive and serve the special needs of the local market. In Canada the situation was the same as the industry disappeared from the Prairies and rural areas and concentrated in the South-Western part of Ontario.

(Map 11 and 12)



A comparison of the entries and exits during this period illustrates the sudden decline after 1920 in the number of companies. (Fig. 6) The greatest decline occurred in the 1922-23 period when 86 firms left the industry and only 31 entered it.⁵ There was a slight increase in entries in 1926 but the exits far exceeded entries after 1920.

This decline in the number of companies and the increase in production resulted in a dramatic change in the spatial pattern of the industry. The overall pattern changed as did the relative importance of some of the major cities. Whereas the period up to 1920 saw a great amount of expansion into all areas of the country, the period after 1920 was one of contraction as the industry began to centralize in the Midwest. (Map 12) All areas of the country lost truck companies especially the areas some distance away from the industrial areas of the Midwest. The small companies that had been set up in the rural areas of the west and south were forced out of business by the larger and more efficient companies in the Midwest. (Table 11)

The period between the wars from 1918 to 1945 was a paradox, since the number of companies decreased, but production increased. Production figures, although they fluctuated greatly in response to economic conditions, rose substantially and even reached one million in 1941. The number of firms experienced a different trend as the 254 companies of 1920 was reduced to only 46 in 1945. (Table 2)

Table 12 : Truck Firms and Production, 1920-1945

<u>Year</u>	<u>Firms</u>	<u>Production</u>
1920	254	322,000
1921	259	148,000
1925	170	531,000
1935	74	697,000
1945	46	656,000

Source: Motor Vehicle Manufacturers Association,
Facts and Figures, Detroit, Michigan, 1977

See also footnote to Map. 5

The Post War Changes

Economic Conditions The decline in the number of truck companies after 1920 was caused primarily by two major factors. One of these was the effect that certain economic conditions had on truck producers. The rather insecure financial positions of most of the small firms made them very susceptible to failure during any downturn in the economy.

There were a number of these downturns, one being the recession in 1921, while the other was the Great Depression of the early 1930's.⁶ The first recession in 1921 was very short, but it signalled the beginning of the decline for many truck producers. Although truck sales dropped for only one year, the loss of markets was too much for many of the small companies.⁷ (Table 12) (Fig. 7)

As a result of this, exits in the industry rose quickly, especially in 1922-23, and at the same time the number of entries decreased substantially. (Fig. 7) As the market dropped by over 50% there was much less for the 250 truck companies to share. Some tried to stay in business by cutting prices, or selling at a loss, but to no avail as the number of companies dropped to only 183 in 1924⁸, the first time it had been below 200 since 1911. (Table 12)

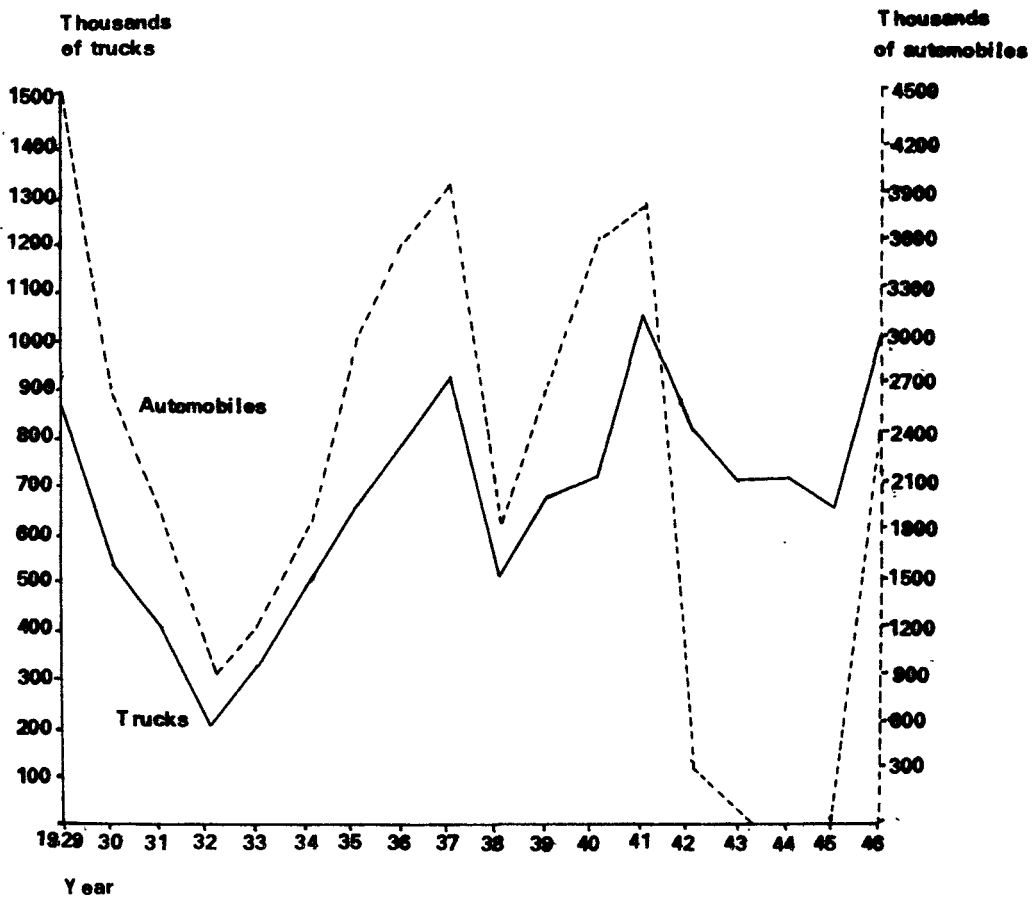


Figure 7

TRUCK AND AUTOMOBILE PRODUCTION, 1929-1946

Source: Statistical Abstract of the United States, 1970, pg. 716

The problems of 1921 were not just caused by the general economic recession. Another very important factor was the Kuhn-Wadsworth bill passed by the United States government in 1921.⁹ After the war, the government found itself with a great number of army surplus vehicles, and no war to use them in. Instead of scrapping them it was decided to distribute them to the state and municipal governments to be used for road building. The result was the disappearance of a large market for new trucks and many firms were faced with empty order books. With a recession in the country in the same year these companies could not easily find other markets and many were soon forced out of business. Exits began to increase and fewer companies were willing to enter the industry. (Fig. 6)

The recession and the distribution of the army trucks by themselves did not have a long lasting effect on the industry. Production increased again in 1922 and continued to do so for several years, especially during the 1920's when much of North America was experiencing the boom years of the "Roaring Twenties".¹⁰ In 1929 this boom ended as the "Great Depression" began and many companies were again faced with reduced markets.¹¹ (Fig. 7)

Much more could be said about the effects of the recessions and especially the "Great Depression" of the early 1930's, but it should suffice to state that they often forced out the companies which were on shaky financial footings and those which had difficulty finding markets for their products.¹² In other words the recessions weeded out the inefficient companies and left only those which were already well established in the industry. In most cases this meant the larger companies which had the resources to survive any downturn in the economy. It was these large companies that were also influential in determining the fate of many of the smaller ones.

The Large Producers The great expansion of the market during the war years could have been even greater if it had not been for the tremendous variety of trucks being offered to the potential buyer. With over 200 truck companies each making different trucks with different parts the only way a truck could be serviced was to buy from the local manufacturer. This situation had caused the great dispersal of truck companies to all parts of the country before 1920, but it also made it very difficult for the truck buyer who was often not yet convinced of the truck's superiority over the horse.¹³

In such a situation it was not surprising that the introduction of a simple, cheap, and reliable truck was welcomed.¹⁴ Most of the trucks being made before 1920 were larger ones which were really the only ones which had been able to successfully compete with the horse.¹⁵ When Ford introduced its one ton truck in 1917 it was immediately accepted and it quickly became the best selling truck in North America.¹⁶ In 1920 over 130,000 of these trucks were produced, accounting for over 40% of all truck production.¹⁷

Within a few years most of the other automobile companies also expanded into truck production.¹⁸ The type of truck they produced was the key to their success. In the case of the Ford, it was based on the Model T passenger car which was enormously successful.¹⁹ Since it used many of the same parts it could easily be produced on the same assembly line as well. With such mass production methods the costs were reduced significantly.²⁰ The price of trucks dropped by over 50% between 1909 and 1929, and the truck was being made accessible to an even greater market. (Table 13)

Table 13 : Truck Prices,1904-1929

	<u>Light Trucks</u>	<u>Heavy Trucks</u>
1904	\$1810	\$3070
1909	\$1030	\$2320
1914	\$1080	\$1780
1919	\$ 914	\$1090
1921	\$ 707	\$ 957
1925	\$ 669	\$ 849
1929	\$ 516	\$ 785

Source: Fabricant S., The Output of Manufacturing Industries, 1899-1937 , National Bureau of Economic Research, New York, 1940, pg.580

The price of these trucks was able to decline mainly because they were easier to make. They could be assembled quite easily by a small shop and sold to the local market, but they could also be built very easily and cheaply on the assembly line just as most of the cars were. It was this fact that eventually spelled doom for the many small companies and the very dispersed pattern of the industry.

The small companies could not compete with the large mass producers in terms of price. One solution could have been to also become a larger producer and thus lower unit costs. This was, however, almost impossible because of the large amount of capital needed. In addition, an increase in production did not necessarily mean increased markets. Another possible solution was to specialize and make large trucks which were not being made by the mass producers. This was also difficult because of the different skills involved and the market was already saturated with such firms. Thus the only solution to many was to either switch to some other industry or to simply go out of business.

Some did manage to stay in business, but as the size of the market increased, the mass producers were able to increase production and lower prices even further.²¹ As a result the number of truck companies dropped each year until it reached only 46 in 1945, and even some of these companies were facing serious competition..

This period from about 1918 to 1945 saw the decline of truck companies from over 200 to just over 40. The pattern of 1920 where dozens of small companies were scattered all over North America changed completely. There was a contraction of the pattern towards the Midwest where the large automobile companies were located.

A number of recessions in the economy played some roles in reducing the number of companies but they alone were not the cause. It was a combination of changes in truck technology and the growing market that really changed the spatial pattern of the industry. As the truck improved it became more widely accepted and markets for it increased. As these markets reached a certain threshold size they attracted the automobile companies which were able to produce a medium size truck at a price that no small producers could match. As a result the industry became concentrated in the hands of a small number of large producers centered around Detroit in the Midwest. By 1945 the majority of companies were either large firms producing small trucks or small firms producing large trucks. Neither was willing or able to enter the other's market and a division of companies by truck size developed that continued into the 1950's.²²

The truck industry by 1945 had gone through a cycle similar to that experienced by the automobile industry a few years earlier. There was the same initial concentration in the Northeast as well as the subsequent shift to the Midwest. As the truck improved it became more widely accepted and there was a great surge in the number of companies entering the industry. A very hectic period followed where both entries and exits were high and the life of companies was often measured by days rather than years. Entry into the industry was extremely easy and truck companies located all over the continent.

This situation changed when the large companies entered the industry and soon were able to force out the many small ones. Just as the automobile industry was dominated by a few large companies, the truck industry was heading the same way. As the companies became larger and better established it was a sure indication of some maturation in the industry. The earlier situation of truck firms appearing and disappearing almost every day was replaced by relative stability. After the 1940's the industry changed very little in its locational pattern, although there were a few notable exceptions.

In the future few major changes are expected in the truck industry. The number of companies may, however, decrease slightly. The small producers could be forced out of the industry if they have to meet increasingly stringent government regulations. In order to survive some may merge with other companies or become parts of large conglomerates. As a result the true independent truck company will probably disappear. In fact most are already parts of other larger companies as are all the major truck producers.

Another future development will really be a continuation of what started in the 1950's. The "Western" truck companies will no doubt expand their market shares even more in the Eastern markets of both Canada and the United States. With rising fuel and maintenance costs such trucks will find many new markets. Some of the Eastern truck companies will also probably build lighter weight trucks but a large market will still exist for the large heavy duty trucks that have traditionally been used in the Eastern part of North America. The large size of the Eastern market will support not only the local companies but also those attempting to enter the market from the West and other areas.

Included in this "other areas" category are Europe and Japan. European trucks were introduced to the North American market in the very early years of the industry and some were very well accepted in the boom years of the 1910's. However as the domestic industry developed, the imported trucks became less desirable since they no longer had any advantage over American trucks.

It was not until the 1970's that imported trucks again became popular. The growing Japanese truck industry entered the market with lightweight pickup trucks, which soon found buyers in the increasing personal use segment.

The latest development has been in the medium duty truck market. Rising fuel costs have resulted in a demand for diesel engine powered medium duty trucks which have not been very popular in the past. The Europeans with years of expertise in this field are beginning to take advantage of the growing market and many have signed agreements with North American truck companies to distribute their trucks in the domestic market. At least one company, Mercedes-Benz, has already announced plans to set up an assembly plant in the Eastern part of the United States and most have many dealers in the east.

Footnotes to Chapter Five

1. See appendix A and the footnote to Map 5 in Chapter 2.
2. op.cit.
3. This was determined from statistics published by the Motor Vehicle Manufacturers Association. These are also available in Appendix B.
4. Much of this increase in production was caused by the entry of Ford into the truck business with the One Ton truck based on the famous Model T passenger car. It eventually gained the same popularity and reputation as the automobile.
5. See footnote to Map 5, Chapter 2.
6. Karolovitz R.L., This Was Trucking, Superior Publishing Co., Seattle, 1966.

In this pictorial history Karolovitz also describes the effects of the Depression of 1929-1935.

7. In many cases it was the small companies that produced specialized large trucks that lost most of their markets.
8. With the Ford model T automobile selling at only a few hundred dollars some buyers especially on farms bought them and converted them into cheap light trucks.

9. Karlovitz R.L., op.cit., pg. 74

Many of the army trucks were left in Europe but there was still a huge number of them in reserve in North America since so many had been produced in the last two years of the war.

10. Montville J., Wheels for Commerce, in The American Car, Automobile Quarterly Publications, New York, 1971, pg. 399

To fit the hectic pace the "Roaring Twenties" some popular trucks were named Speedwagons or Speedtrucks. These were fast and light but could carry a greater amount of cargo than the traditional light truck.

11. General Motors, GMC, the Truck People From General Motors, GMC Publications, 1972, pg. 10

One solution to the declining markets was to merge with other companies. This is how the GMC truck division was created, merging Reliance, Rapid, Randolph and Yellow.

12. op.cit. pg. 15

13. Epstein R.C., The Automobile Industry, A.W. Shaw Co., New York, 1928, pg. 89

14. Ford Motor Company, The Ford Truck, Ford Motor Company Publications, Detroit, 1956, pg. 34

15. Karlovitz R.L., op.cit, pg. 22

16. Epstein R.C., op.cit., pg. 324

17. op.cit.

18. Ward's Automotive Yearbook, 1955, pg. 127-139

Chevrolet started in 1918

Dodge started in 1917

19. Epstein R.C., op.cit., pg.305

"The Ford truck, a one ton vehicle,made in the same plant as the passenger car,has practically the same chassis as the passenger car,except for a heavier frame,heavier springs,and different wheels,and rear axles. Its motor,transmission,and front axle assembly are identical with those of the passenger vehicle."

20. See footnote 10,Chapter 3

21. op.cit.

22. The automobile companies produced only the smaller trucks but in the early 1950's they started to expand into the heavy truck field.

See Ward's Automotive Yearbook,1955,pg.127-139

CHAPTER SIXThe Post War Industry, 1945-1977

When the war ended in 1945, the truck industry was much different than it had been at the end of the First World War. The number of companies had been reduced to about a fifth of the number of 1918.¹ The firms that did manage to survive the many events up to 1945 were in most cases much larger than the average truck firm of 1918.² The spatial pattern of the industry was also very different as the large companies were concentrated in the Detroit area, while most of the small specialized producers were scattered in other parts of the country.

Even though the number of truck companies had decreased substantially, production was much higher than in 1918. During the war, while car production had been greatly reduced, truck production rose substantially. (Table 14) This was mainly the result of a large number of trucks needed for the armed forces. After the war it would be the civilian market which would create prosperity for the truck industry.

The Post War Boom Soon after the end of the First World War, the truck industry was seriously affected by the distribution of army surplus trucks by the government. In 1946 such a problem did not develop as very few of the army trucks took away sales from the truck firms. The main reason for this was that the army trucks of the 1940's were specially designed for rugged off-road army use and they were not suitable for use on the highways.³ Also, the civilian market had not been able to buy very many trucks during the war years and many were using old trucks that sorely needed replacement.⁴ The truck companies thus found themselves with a tremendous demand for vehicles of all kinds. Production increased rapidly and reached 1,200,000 in 1947.⁵ (Table 14) See also Appendix A.

Except for a few years, production continued to increase until it hit a record of over 3,000,000 in 1974.⁶ As production increased, the number of companies continued to follow the trend established after 1920, and declined in number. The result was even larger companies in both the small and large truck categories. In most cases the failure rate was much higher for the small truck firms than for the larger ones.

Production was able to increase because of the growing demand for truck transport in both the United States and Canada.⁷ In the 1920's the truck competed with the horse, but in the 1950's it began to compete with the railways.⁸ The truck gradually became the main source of goods transport for light industry and was the only way many small towns could receive or ship goods.⁹ The flexibility of the truck in that it could travel on ordinary roads and not on special rail lines made it an indispensable form of transport, especially for small loads and short distances.¹⁰ As roads improved, the truck was able to carry larger cargoes and travel greater distances. This was aided by the technological developments in the truck itself which allowed it to travel much faster and carry a greater amount and variety of cargo.¹¹

Of the road improvements, the most important were the construction of the Interstate highway system in the United States and the Trans Canada highway in Canada.¹² For the first time they allowed relatively easy travel from coast to coast, as well as linking the major cities of both Canada and the United States. (Map 14) As a result there was a great increase in the amount of inter city truck travel, which in turn caused an increased demand for large trucks.¹³

In addition to the increase in inter city truck travel there was a rapidly growing number of small trips. The flexibility of the truck enabled industry to locate in the suburbs, away from the rail lines and the older areas of cities.¹⁴ The truck allowed the move to the suburbs, and as more industry did so, the market for trucks increased.

In the 1950's the truck also began to compete seriously with the railroads. The improved roads and better trucks made the movement of certain types of goods more economical by truck than by train, especially for short distances. Much of the light manufacturing sector began to depend on trucks rather than rail.¹⁵ One situation in Canada, the rail strike of 1951, proved that the truck could be used for even coast to coast transport.¹⁶ As a result, many companies began to use both rail and truck transport to protect them from future strike problems.¹⁷ The situation was the same in the United States as more short rail lines were replaced by trucks. All of this helped to increase the market for trucks, especially the large ones which could haul tractor trailers and large volumes of goods.

Table 14 : Truck Production and Companies, 1945-1977

<u>Year</u>	<u>Companies</u>	<u>Production</u>
1945	46	655,600
1950	45	1,337,000
1955	41	1,248,100
1960	39	1,194,400
1965	37	1,751,800
1970	34	1,692,400
1977	26	3,440,335

Source: Motor Vehicle Manufacturers Association,
Facts and Figures, Detroit, Michigan, 1977

Note: Production totals include buses.

Although the number of companies decreased to only 26 in 1977 there was still a considerable amount of expansion by the existing companies. With the truck market growing so rapidly the companies tried to gain as much of the market as possible. This meant expanding product lines for a greater variety of offerings to the buyers, but it also resulted in expansion into new market areas. This in many cases caused the establishment of new truck assembly plants even though the capital costs were extremely high. Most of these new plants were to be not in new areas but in the older, well established markets.

Post-war Expansions One of these post-war expansions was the movement of truck companies into Canada. Although Canada had an old truck industry dating back to about 1910, most of the industry developed after 1950.¹⁸ The tariff system of Canada was such that it prevented the free export of trucks from the United States.¹⁹ This was set up mainly to encourage Canadian production, but the small size of the market prevented the successful development and marketing of high quality trucks. Some were imported from Great Britain but they were not always suitable for the Canadian market conditions.²⁰ To enter the Canadian market, the American auto companies began establishing assembly plants in areas such as Southern Ontario.²¹ Eventually, when these companies started making trucks, they also expanded their Canadian operations to do the same. The result was that there were actually very few Canadian owned truck builders. The ones that were Canadian were usually the small producers of the larger trucks.²² These companies were also small in the United States and had not been able to easily expand into Canada.²³ Some did, however, start selling trucks in Canada even though the tariff made their prices rather high.²⁴

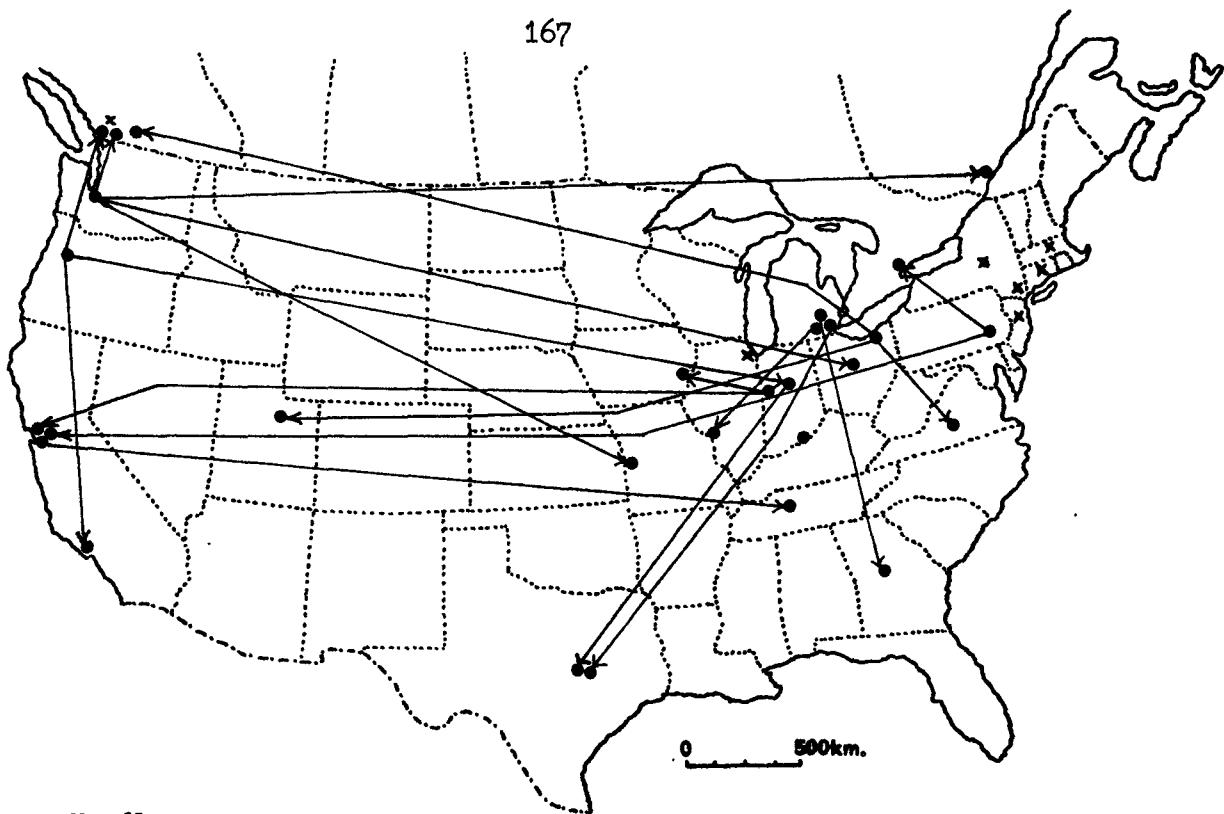
In 1966 the United States and Canada signed the Auto-Pact which enabled the tariff free movement of new vehicles and parts between the two countries.²⁵ This had the effect of making them into one unified market. Its major contribution was that the Canadian automobile and truck companies no longer had to make small numbers of almost every model for the Canadian market. Some models could be produced in Canadian plants for the whole North American market, while others could be easily imported. For a truck company it allowed specialization if it had a number of assembly plants. One company such as the International Harvester Co. was able to produce one model in its Chatham, Ontario plant for distribution to the whole eastern North American market.²⁶

The Auto-Pact did not, however, result in many new assembly plants. Most truck companies were already making trucks, although on a rather limited scale, in Canada before 1966.²⁷ What it did cause was a considerable amount of expansion of the existing facilities to serve the growing Canadian market and for shipment of trucks to the United States market as well.²⁸

This expansion into Canada was only part of the activity that was going on in the industry after the war. Truck companies of all sizes were establishing branch plants in all parts of North America. (Map 13) There were three basic movements in this period of expansion. One was the setting up of plants in Canada. The second was the movement of truck companies away from the East and Midwest to the South and West. In the Northeast, especially a number of truck assembly plants were closed between 1945 and 1977. (Map 13)

Many of the Midwestern companies either moved to or established branch plants in the South where land, taxes and labour unrest were the lowest. (Map 13)

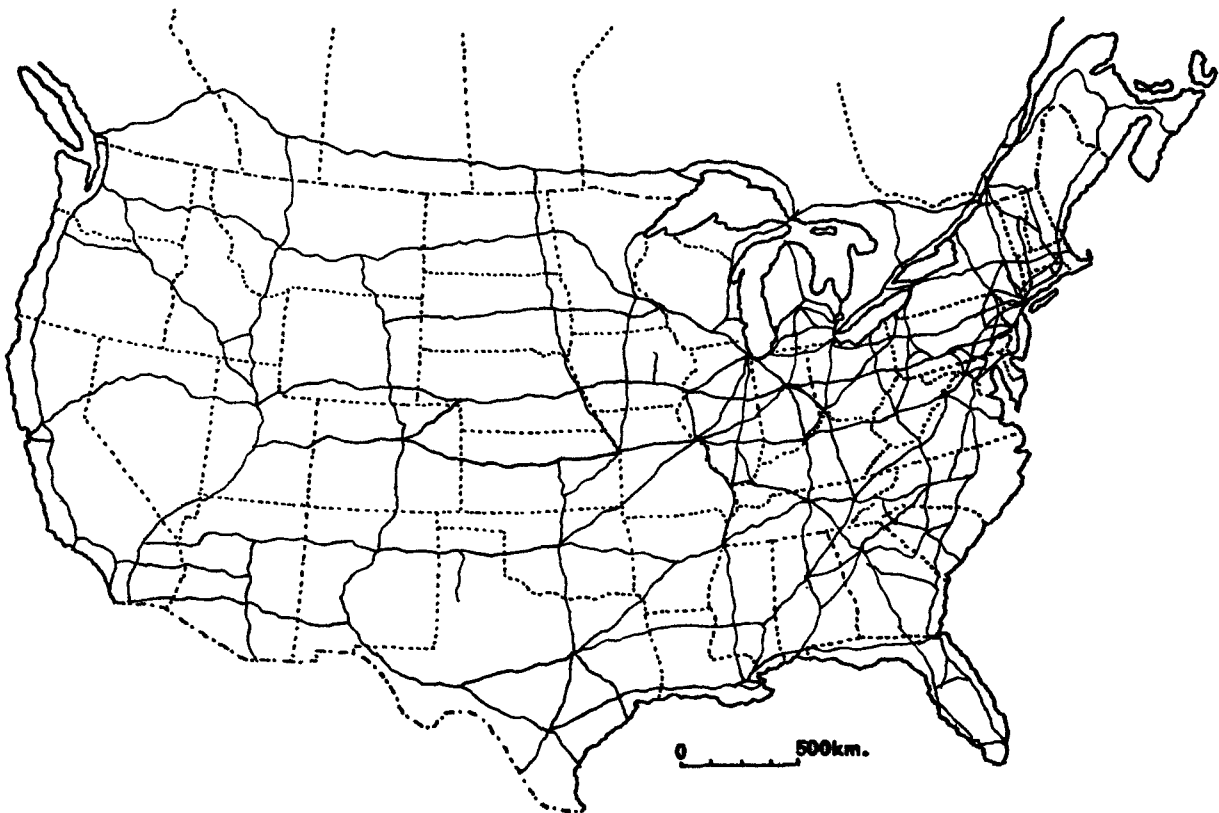
The third movement was the establishment of branch plants in the Eastern part of the country by the West coast companies. Most of these were the result of the increasing costs of shipping components such as engines from the Midwest to the West coast, and then back again to the Eastern markets. (Map 13) These new plants were also usually on the fringes of the main industrial areas of the Midwest.



Map 13:

BRANCH PLANTS ESTABLISHED, 1946-1976

Source; See note to Map 5



Map 14:

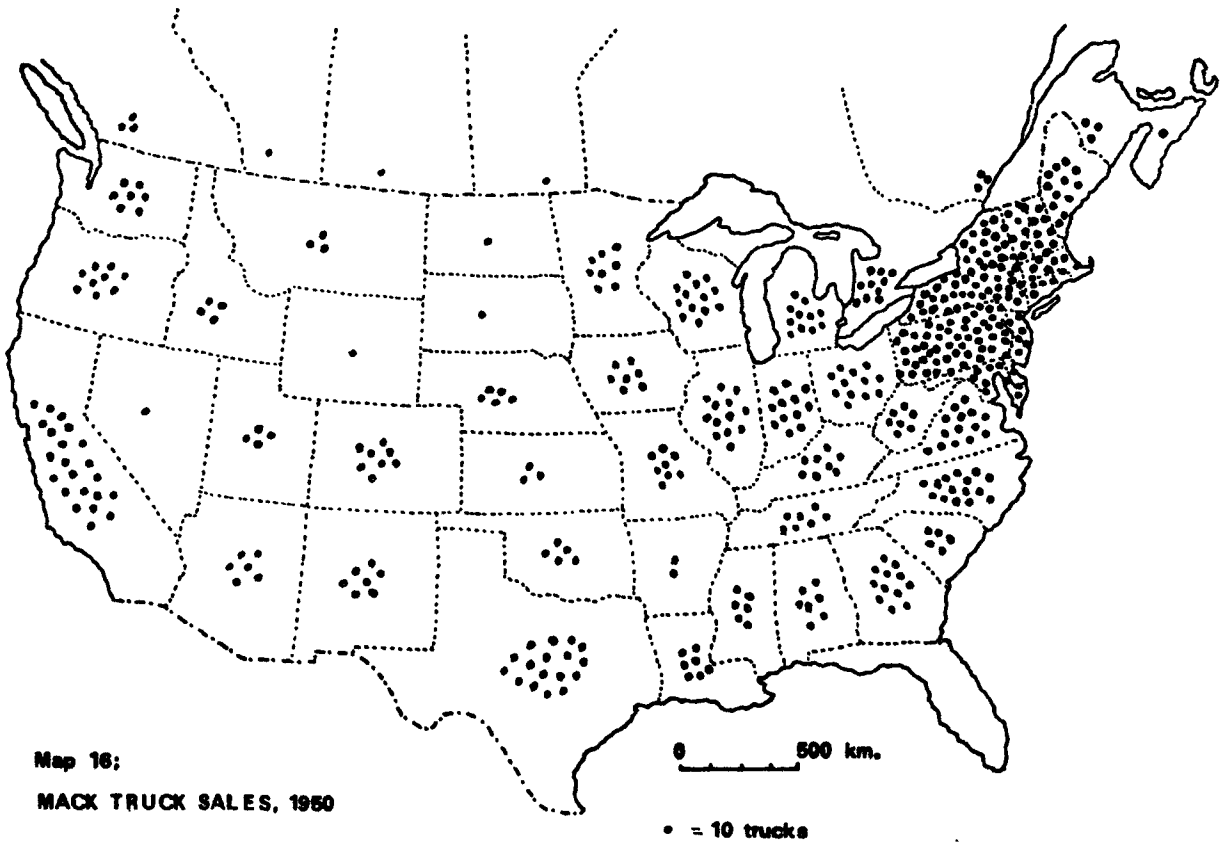
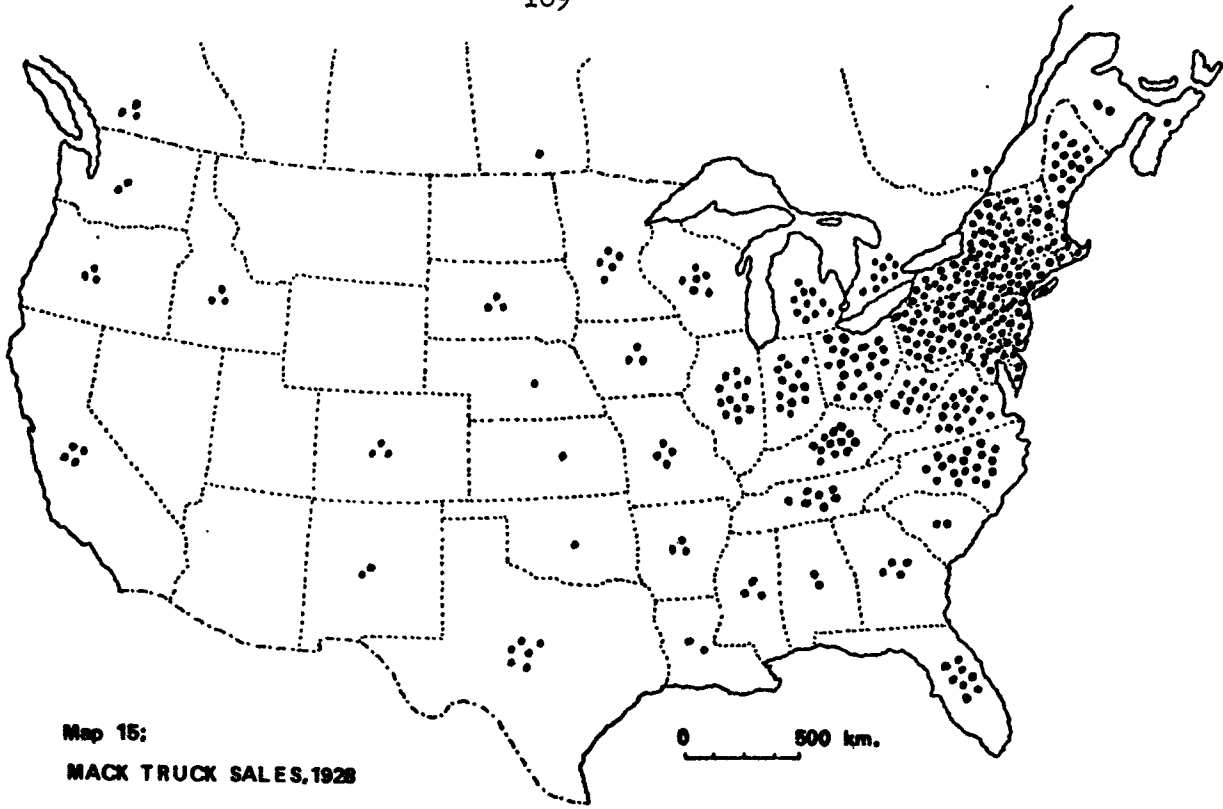
THE INTERSTATE AND TRANS CANADA HIGHWAY SYSTEM, 1977

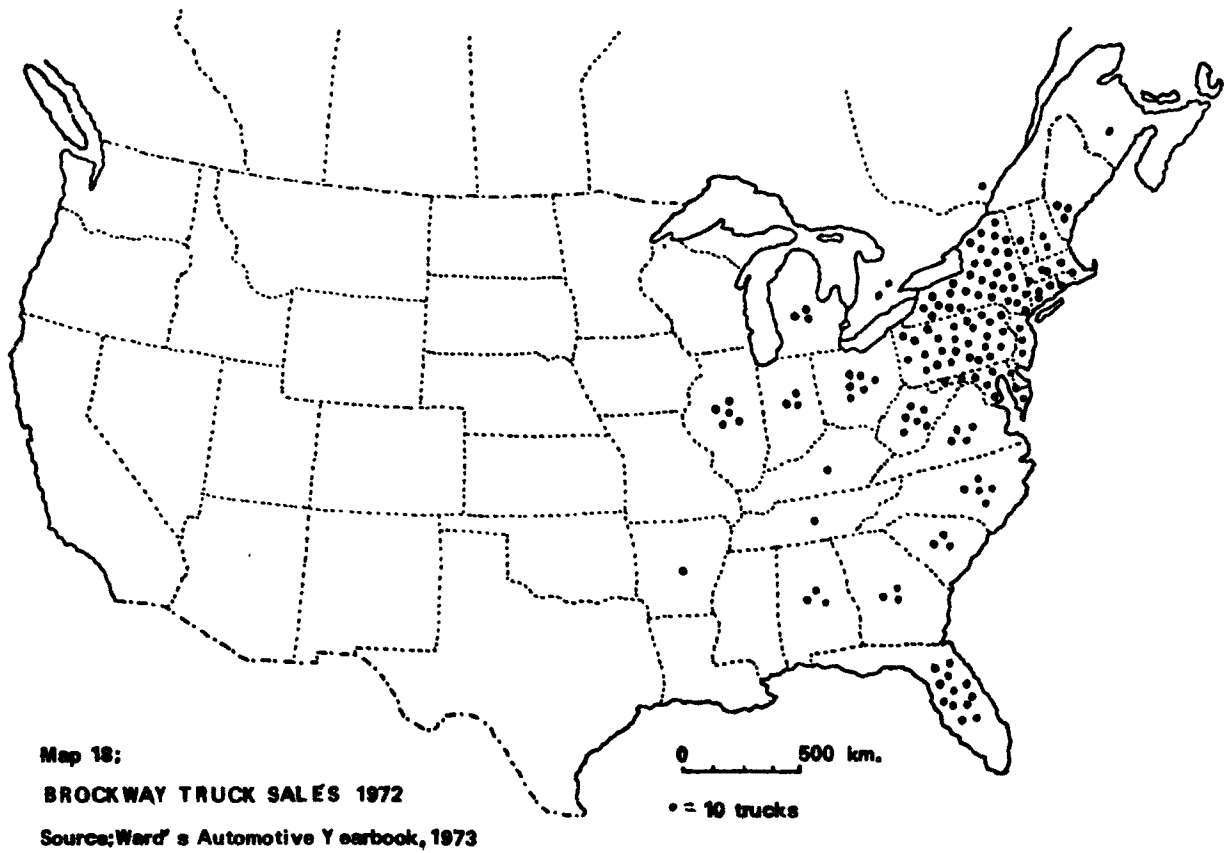
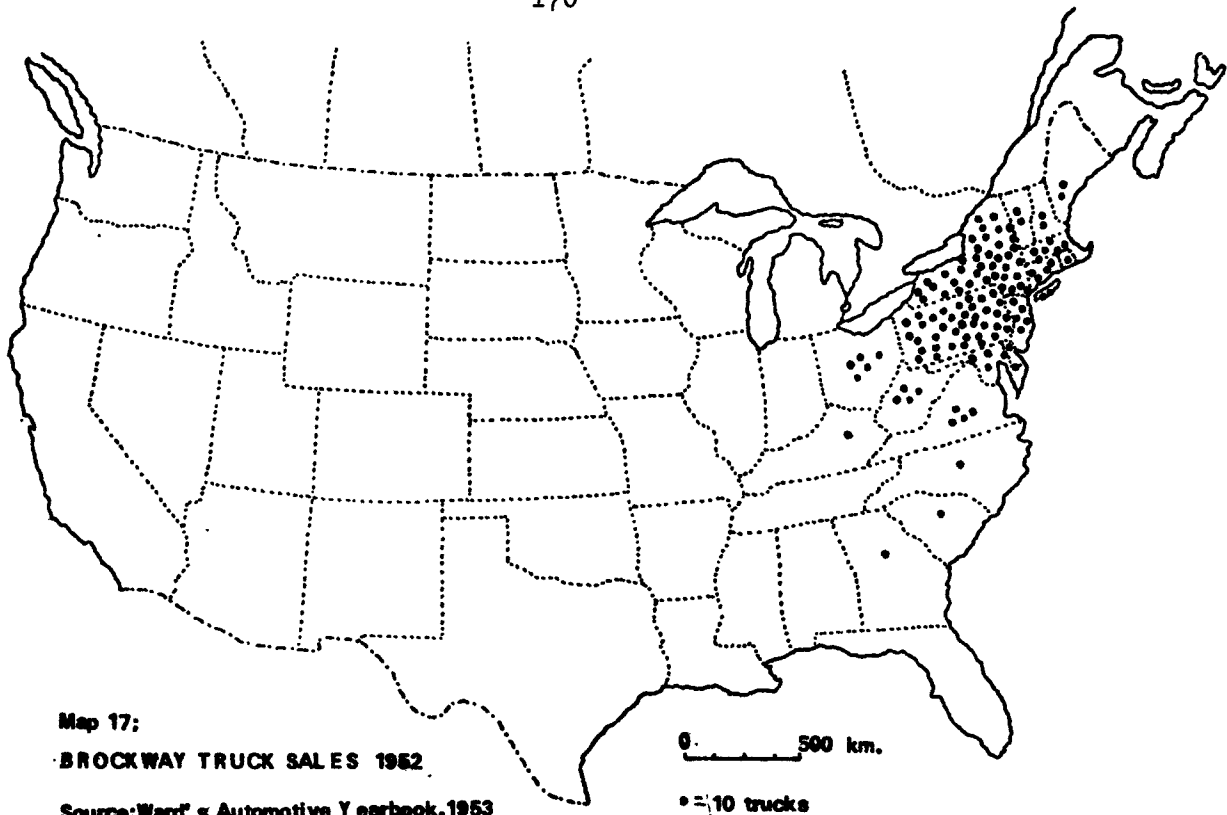
Source; Ward's Automotive Yearbook, 1977

Motor Vehicle Manufacturers Association.

During this period of expansion and growth in the industry some firms expanded from regional markets to national and sometimes even international ones. One such company was the old and well established firm of Mack, based in Allentown, Pennsylvania. As early as the 1920's it was selling trucks on the West coast and in Canada.²⁹ By 1950 it had become important as a supplier of heavy trucks to all parts of the country. (Maps 15 and 16) In the 1970's the sales pattern and market penetration remained nearly the same although there was a decrease in the Western regions.

Some companies did not expand greatly into other areas or even into Canada. In many cases the type of truck they produced was neither suitable nor competitive in other markets.³⁰ One such company was the small firm of Brockway from Cortland, New York. It continued to sell its trucks only in the East, although it did expand to the South by the 1970,s . (Maps 17 and 18) In 1977 its expansion ended as it was forced out of the truck business, partially because of new and expensive government regulations but also because of increasing competition from the Western truck companies.





The Western Truck Industry Of all the developments of the post war period, the most significant was the growth of the truck industry on the West coast of both the United States and Canada. There had been some truck companies on the west coast as early as 1900 but a real industry had not developed.³¹ There was a flurry of activity during the boom years of 1910-1920, but few of those companies were able to survive for very many years.³² Production was, and always had been, very limited, and the companies made little attempt at expanding to other markets. Most were concerned only with serving the needs of the local market which needed trucks that were not being made by the Midwestern companies.

Some were actually the assembly plants of the Midwestern companies such as Ford, but they made only the light trucks for urban and agricultural uses.³³ Almost all of the local West coast producers were involved in the production of large trucks for such applications as logging and mining. In some cases there were expansions of the Eastern and Midwestern companies into the growing West coast market.

Companies such as Mack started selling trucks in the West as early as the 1920's .(Map 15) It first established sales agents, then dealers, and finally an assembly plant in 1947.³⁴ By the time actual manufacture started, the company was well established in the West coast market. There were few large trucks actually being built in the West and as a result Mack was able to penetrate this market. There was, however, a problem since the trucks which were built to Eastern designs were not always the most suitable to the Western market conditions. The special needs of the western markets lead to the development of a "Western" truck as well as an independent Western industry to manufacture it.

The Western Truck The West, which includes the Pacific and Mountain regions had some unique characteristics that influenced the design of trucks. The topography, long distances, special economic activities, and artificial factors such as weight regulations, all affected the truck's operating conditions, and thus its design. In combination with the factor of the West's isolation from the rest of the country, they were the main cause of the development of a special "Western" type of truck.³⁵

One of the special characteristics of the West was the long distance that the truck had to travel. In the East and Midwest the distances were much shorter because there was a greater number of cities and a much higher population density.³⁶ Trucking companies in the East had much shorter average trips although in many cases their loads were not as large. (Table 15) In the West the distances are are much longer as there are few cities very close together. (Map 14) As a result the average West coast trips are almost four times as long as those in the rest of the country. (Table 15)

Table 15 : Truck Travel, Loads and Distances, 1977

	<u>Average Distance</u>	<u>Average Load</u>
West	800 mi.	14.5 tons
Midwest	250 mi.	8.7 tons
Northeast	130 mi.	6.2 tons

Source: Compiled from, the American Trucking Association, Results of Operations,
1977

The much larger size of the states in the West also affect the distance travelled. Since many trucking companies operate only in one state, it is obvious that the company operating in California would probably have much longer average trips than one in Connecticut.³⁷ Some of the Western companies even have hauls that average 1,000 mile one way.³⁸ Most of these very long hauls are the result of intercontinental truck travel.

Since most of the United State's and Canada's industry is concentrated in the Eastern part of the continent there is a large volume of manufactured goods moving to the West.³⁹ In most cases it is the Western trucking companies that have to travel across the country to pick up these goods.⁴⁰ With such good roads as the Inter-State System in the United States the trucks can often compete with the railways in certain types of cargo.

In addition to the long distance the trucks have to travel across a number of mountain ranges with long steep hills, and the problems of high altitudes.⁴¹ Such conditions are not found in many areas of the East or Midwest.

To illustrate the special conditions of the West, and the need for special trucks, the following quote from a Mack truck advertisement is used.

"The West has its own story to tell.
Grades are tougher...hauls longer...
cargoes bigger. Increased payloads
resulting from lighter chassis weights
have never been a more critical profit
factor than in the West. And its just as
important in medium distance hauls as in
overnight long hauls. Mack custom builds
the Western RL to Western specifications
for lower curb weight and bigger cargo
capacity." ⁴²

The "Western" truck is usually much lighter, since it uses more aluminum and fibreglass. It is also more powerful in most cases than an Eastern truck, with a greater variety of engines and transmissions. It is designed to pull long trailers over very long distances and still be as profitable as a truck making short hauls.

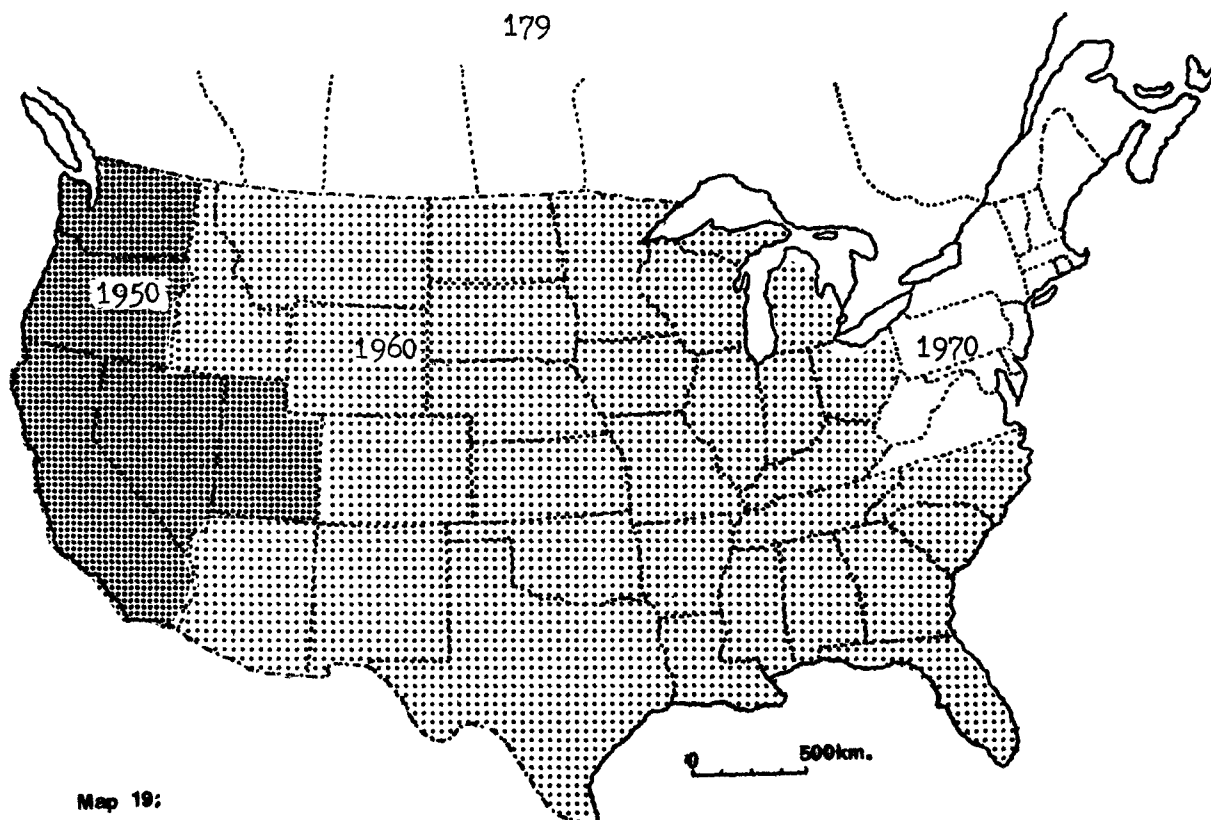
The "Western" trucks had to be made light but powerful because of the distance and topography of their environments. The longer the truck is on the road the more expensive it becomes to transport the load. In many cases the truck may have to travel all or part of the distance with only a partial load or in some cases even empty. To offset this problem of long distances without profitable loads the solution was to increase the size of the truck so it could carry a much larger load when it was full. The problem with this was that there were maximum weight and size limits on most roads.⁴³ The only solution then was to reduce the weight of the truck so that a greater share of the total vehicle weight, (GVW or GCW) was cargo. This was done by redesigning the truck so that many components such as the frame, cab, bumper, etc. could be made of aluminum.⁴⁴ In other areas such as the hood and fenders, light weight fibreglass could be used. To maintain the most economical speeds on the highway, larger engines were installed to suit the larger trucks. In this way the "Western" truck type was developed, but since no such truck could be bought from Eastern companies it had to be built by the Westerners.

To produce the trucks for the Western market a number of companies either started or expanded their operations. Some had started just before the Second World War but were not able to get into serious production until after the war.⁴⁵ At first they expanded to serve only the Western markets of long distance hauling and forestry operations. Later they began to expand their sales territories towards the East. This Eastward push was the result of increased acceptance of the "Western" type of truck for the shorter hauls of the East and Midwest.⁴⁶ Since the purchase price of a truck was only about 20% of its total cost during its lifetime, it became more economical to purchase the more expensive but longer lasting "Western" type of truck. With minor modifications they could be sold in all areas of the country. With such new markets opening up the Western truck producers began to expand into the Eastern and Midwestern markets, first in terms of sales but later in production as well. Since some Midwestern companies were expanding to the West at about the same time there was a considerable amount of activity in the locational pattern of the industry in the period after the war. (Map 13)

One of these Western companies was Peterbilt of California. It started operations in 1939 to serve the needs of the West coast truckers. Because parts were only available from the Midwest they had to be shipped in at considerable ⁴⁷cost. This made the truck expensive but it was still a better alternative to the trucks made in the Midwest. The trucks were custom built to the buyer's specifications and as a result the rate of production was very low.⁴⁸

At first the company only sold trucks in the West, especially California where there was a loyal market for Peterbilt trucks. (Map 20) In 1955 the Peterbilt sales areas included only seven of the Western states, with almost all sales in California. The dealers for the trucks were also concentrated in California, and it was not until 1950 that one was set up outside that state.

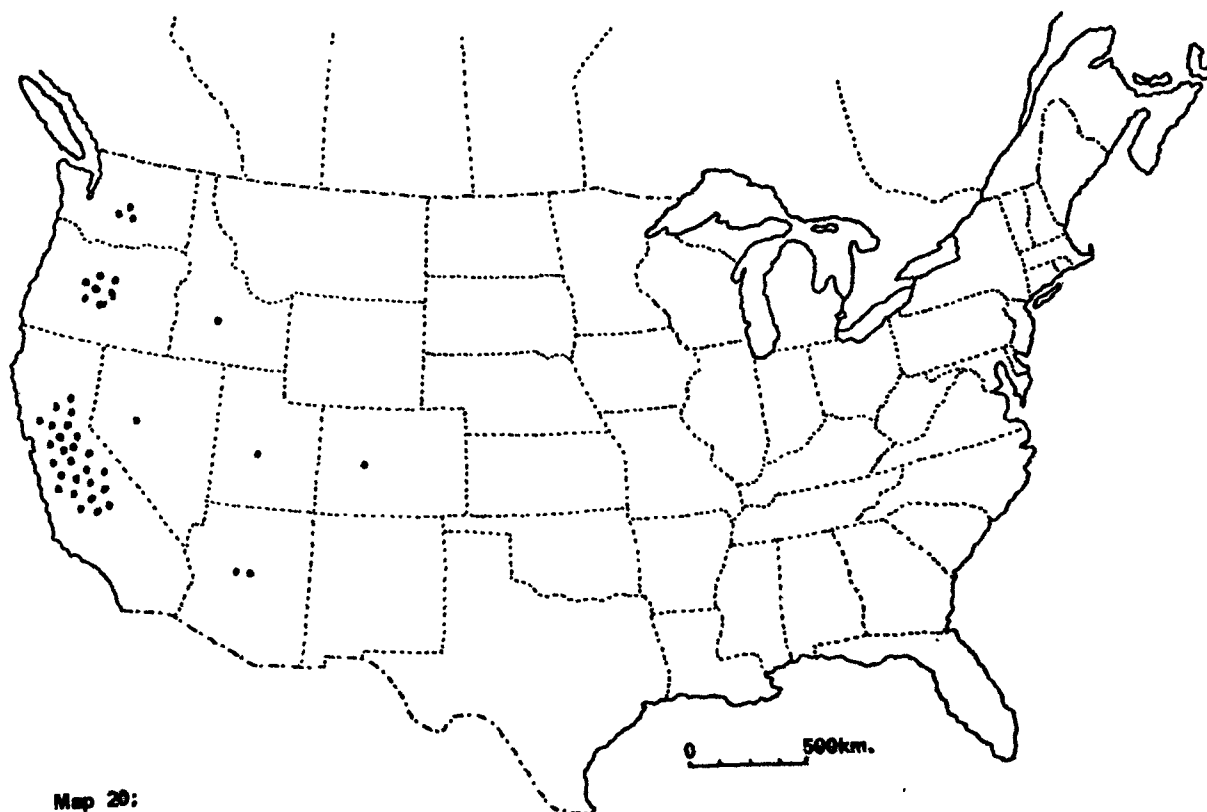
In the 1960's the company began to establish more dealers towards the East and by 1969 there were Peterbilt dealers in every state except in the Northeast. Much of the expansion at this time was concentrated in the South, especially Texas. (Map 19) The new dealers



Map 19:

PETERBILT DEALERS, 1950-1977.

Source: Correspondence with Peterbilt dealers, 1977



Map 20:

PETERBILT TRUCK SALES 1955

Source: Ward's Automotive Yearbook, 1957

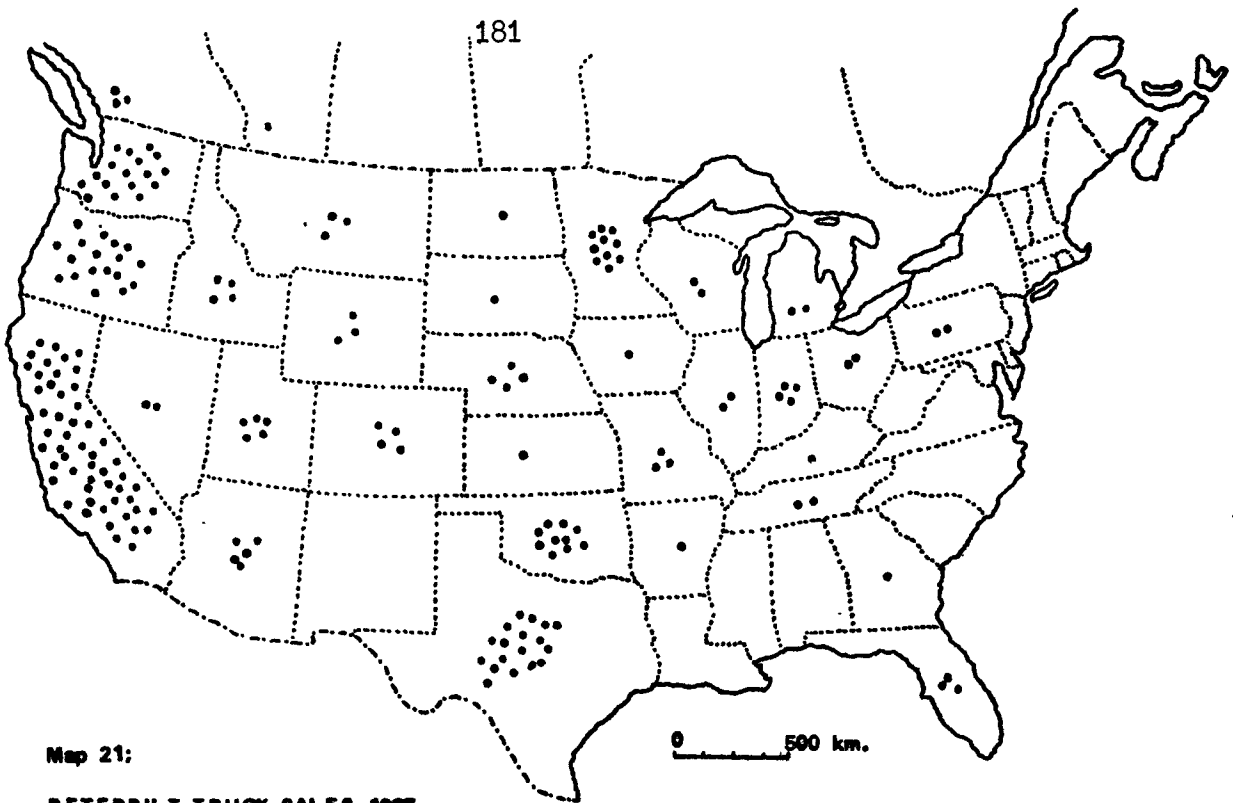
• = 10 trucks

soon had an effect on sales and by 1965 Peterbilts were being sold not only in the West but in most states of the Central part of the United States as well. (Map 21) The fastest growth area was in Texas where Peterbilts became popular for long distance hauling and for oilfield work.

As sales continued to increase in the Eastern and Southern parts of the country, as well as in the West, the company was being faced with a problem . It was becoming rather expensive to purchase components and parts from the Midwest, ship them to the West coast, assemble the truck and then ship it back to the Midwest or South again. The solution to this was the establishment of an assembly plant in the new market area.

The location chosen was Madison, Tennessee, in the Southern part of the United States.⁴⁹ At first this seems to be an unusual location since it is some distance from the parts suppliers of the Midwest. It did, however, have some important advantages.

One of these was the labour situation. The company did not want to locate in the Midwest where parts were close by, but labour unions were more militant and demanding.

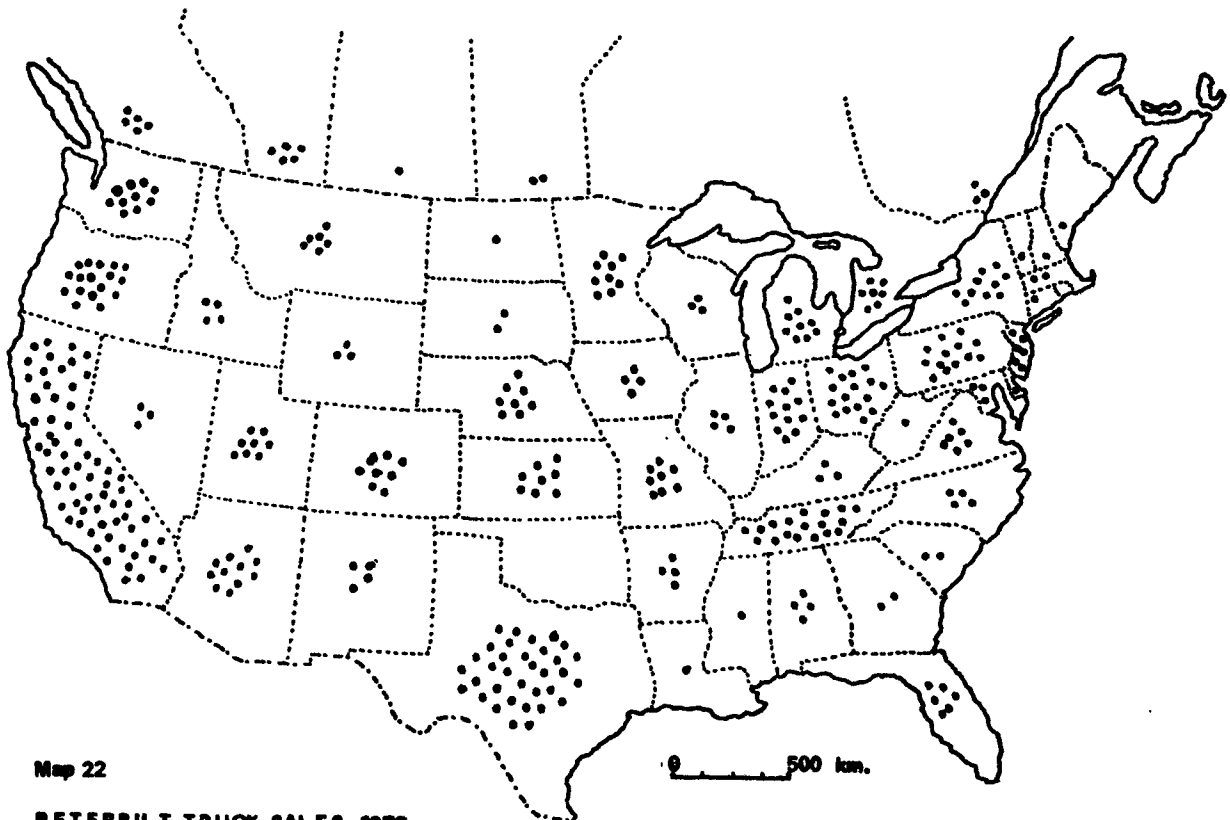


Map 21:

PETERBILT TRUCK SALES 1965

Source: Ward's Automotive Yearbook, 1965

• = 10 trucks



Map 22

PETERBILT TRUCK SALES 1976

Source: Ward's Automotive Yearbook, 1977

• = 10 trucks

In the South of the United States, labour unions are not nearly as strong, especially in areas of high unemployment. In addition, with the lower cost of living the labour rates were lower and the unions were not constantly demanding more money. This strategy of locating small assembly plants in areas of weak labour unions was also used by Peterbilt's sister company in the PACCAR group, Kenworth.⁵⁰

The idea behind this was to lower costs and be more competitive in the heavy truck market.

With production from its Tennessee plant as well as from California, the company's sales increased in volume and in extent. By 1976 Peterbilts were being sold in almost all parts of North America and dealers were set up in the 1970's in the Northeast and Canada. The company, as did all the Western truck builders, continued to only have a small market share in the East when compared to the excellent market penetration it enjoyed in the Western parts of both Canada and the United States. (Table 16)

Table 16 : Regional Variations in the Canadian
Group 8, Diesel Truck Market, 1977

Central Canadian Companies

	West	Central	East
Mack ^a	873	929	118
IHC ^b	773	1577	135
Ford ^c	678	1511	96

Western Canadian Companies

Kenworth ^d	1167	511	63
Peterbilt ^e	380	124	10
Freightliner ^f	532	213	40
White ^g	550	639	71

Notes: a. Most of the Macks sold in Western Canada are "Western" models from California

b. Most Internationals are from Indiana.

c. All Fords are from Louisville, Kentucky

d. Kenworth has plants in Montreal and Burnaby, B.C.

e. All Peterbilts come from either Tennessee or California.

f. Most Freightliners come from Oregon.

g. Whites come from Cleveland, Ohio or Kelowna, B.C.

Source: Figures are from R.L. Polk Statistical Services. The notes are determined from Motor Vehicle Manufacturers Association, figures., 1977

By 1977 the Western truck companies had become quite large national producers, rather than just small local ones. They first established themselves in the Western markets because no Midwestern companies could supply trucks suitable for the special operating conditions of the West. Based on this success they expanded East ward first in sales and ultimately in the form of actual production facilities. The acceptance of the "Western" type of truck in the rest of North America was the major cause of their success. In 1977 these Western companies had five assembly plants on the West coast and another five in the rest of the United States and Canada.

The rest of the industry, both the builders of small and large trucks began to move away from the well established industrial areas of the Midwest and Northeast. They often found that the advantages of moving to more remote areas outweighed the disadvantages of moving away from the major markets and parts suppliers. In this way the truck industry seemed to be following a trend being set by many other industries as the amenities factor began to influence industrial location.

Footnotes to Chapter Six

1. See appendix B and also the Footnote to Map 5
Chapter 2
2. In 1918 the average production per firm was only
922 trucks while in 1945 it was over 14,000 per
year per firm. See appendix A and B.
3. Karolovitz R.L., This Was Trucking, Superior Publishing
Co., Seattle, 1966, pg.53
4. Although truck production remained very high during
the war years, much of this production was for war
needs, and only in the later years of the war were
trucks released to the domestic market.
5. See appendix A
6. Until 1978, truck production was at an all time high
in 1974.
7. Montville J., Wheels for Commerce, in, The American Car,
Automobile Quarterly Publications, New York, 1971, pg.404
8. op.cit.
9. Motor Vehicle Manufacturers Association, Facts and Figures,
MVMA, Detroit, Michigan, 1977, pg. 73
10. Dykes J., Canada's Automobile Industry, McGraw-Hill,
Toronto, 1970, pg.95

11. Montville J., op.cit., pg. 404

There were many improvements in engines, axles, and transmissions on the trucks. In addition there was greater use made of semi trailers and even multiple trailers.

12. Motor Vehicle Manufacturers Association, op.cit., pg. 63

13. American Trucking Association, Results of Operations, 1965, pg. 6

14. Dykes J., op.cit., pg. 95

15. Motor Vehicle Manufacturers Association, op.cit. pg 73

16. Dykes J., op.cit., pg. 97

17. op.cit.

18. Companies such as Ford started truck production in Canada in 1919. There were also Canadian companies such as the National (1920) and the Sicard (1936). American companies such as Mack also started selling trucks in Canada as early as 1921.

19. Byrnes T., The Automobile Industry in Ontario, MA Thesis, University of Toronto, 1951, pg. 62

Up to 1926 there was a 35% tariff on U.S. trucks, and 26% after 1926

20. op.cit., pg.60
21. Mack established an assembly plant in Toronto in 1965. White and Kenworth set up plants in Montreal in the 1960's as well.
22. Most of these companies were able to sell their trucks in the Canadian market despite the high tariffs because there were no Canadian built trucks to compete with.
23. Most sold trucks in Canada well before they set up assembly operations.
24. See footnote 22
25. Beigie C.E., The Canadian American Auto Agreement; An Evaluation , Can-Am Committee, Montreal, 1970, pg. 136
26. International Harvester Canada; Annual Report, 1970
The Chatham, Ontario plant assembles Cargostar models for the Eastern Canadian and United States markets.
27. See footnote 21
28. Mack and Kenworth both expanded their facilities in the late 1960's and White set up a new plant on the West coast.

29. See footnote 18.
30. Brockway Company History, 1975 The company planned to specialize in only heavy duty trucks for the Eastern markets.
31. See Maps 9 and 11
32. There were 17 firms on the West coast in 1921 but only 8 in 1945.
33. Ford was one company that had expanded to the West as early as 1921, when it started small scale assembly of the one ton truck there.
34. Montville J., Mack, Haessner Publications, New Jersey, 1973, pg. 42
35. The "Western" type of truck was one which used much light weight materials such as aluminum and fibreglass. It was specially designed for Western operating conditions.
36. Statistical Abstract of the United States, 1977, pg. 167
37. American Trucking Association, Results of Operations, ATA, Washington, 1976, pg. 7
38. Consolidated Freightways, Annual Report, 1976, pg. 5
In 1976 the average length of haul was 1,405 miles, and the average load was 32,604 lbs.
39. Motor Vehicle Manufacturers Association, op.cit., pg. 73

40. Consolidated Freightways, op.cit., pg.7
41. The long hills require larger engines to maintain economical travel speeds. The thin air at high altitudes reduces power and thus larger engines are needed than for low altitude travel.
42. Mack Western advertising brochure, 1975
43. Bus and Truck Transport, Canadian Size and Weight Requirements for Commercial Vehicles, Maclean Hunter, Toronto, Sept, 1977, pg.50-51
44. Western trucks often can weigh more than 1,000 lbs. less than comparable "Eastern" trucks.
45. See footnote 38, Chapter 3
46. Consolidated Freightways, op.cit., pg.8
47. The major parts suppliers were all located in the Midwest. e.g.,
- | | | |
|---------|---------------|----------|
| Cummins | Engines | Indiana |
| Fuller | Transmissions | Illinois |
| Eaton | Axles | Ohio |
48. Peterbilt Corporate Literature, 1976, pg.8
49. op.cit., pg.9
50. PACCAR Annual Report, 1975, pg.18

CHAPTER SEVEN

Summary and Conclusion

The preceding chapters have attempted to illustrate and explain what has happened in the truck industry since its beginnings in the 1890's. In most cases they have gone into considerable detail to explain and illustrate what happened in the industry and why. It is now necessary to summarize the work of these previous chapters.¹

As the truck industry developed, it underwent a number of significant locational changes. It gradually evolved from a small group of tiny firms concentrated in the Northeast, to a large industry with companies all over North America producing trucks for the national and even international markets. In between, there were numerous relocations, expansions, and contractions in the locational pattern as the industry responded to various external and internal factors.

While it is true that chance or accident played an important role in determining the industry's locational pattern, there were many other factors as well. These factors were responsible for the pattern in which the industry developed. They helped influence a company's location but they also had an affect on when, where, and why a particular location was chosen.

The spread of truck companies across North America was influenced mainly by a number of barriers or forms of resistance.² These barriers could be physical such as mountains, rivers or distance, but in the majority of cases they were artificial. Some of these artificial barriers were the resistance to the truck as a replacement for the horse, and various technological changes in the truck itself. The location pattern of the industry was determined largely by the changing strengths of the barriers or forms of resistance.³ They were important location factors since they not only varied through time but they also exhibited considerable variations in a spatial context. Thus they helped to influence not only the size and structure of the industry but its spatial pattern as well.

The truck industry first began its operations in the Northeastern region of the United States in the later years of the 1890's. This location was not a surprising one since it had all the possible advantages and few of the disadvantages. Even if the initial location of the industry had been simply determined by chance, the odds that it would be in the Northeast were overwhelming. With most of the nation's population, industry and trade it was a natural choice for the introduction of the motor truck.

As the industry grew in size after 1900, its spatial pattern remained increasingly concentrated in the Northeast, especially in New York City. (Fig. 8) This concentration was caused partially by the fact that the major markets, and parts suppliers were located there and the truck companies needed to be close to them. Another reason was the influence of certain barriers which forced the industry to locate in the Northeast.

One of these barriers was the lack of markets outside the major cities for trucks. Lack of acceptance of the truck as a form of commercial and agricultural transportation was one barrier but another even more important one was related to the design of the truck and the conditions in which it had to operate.

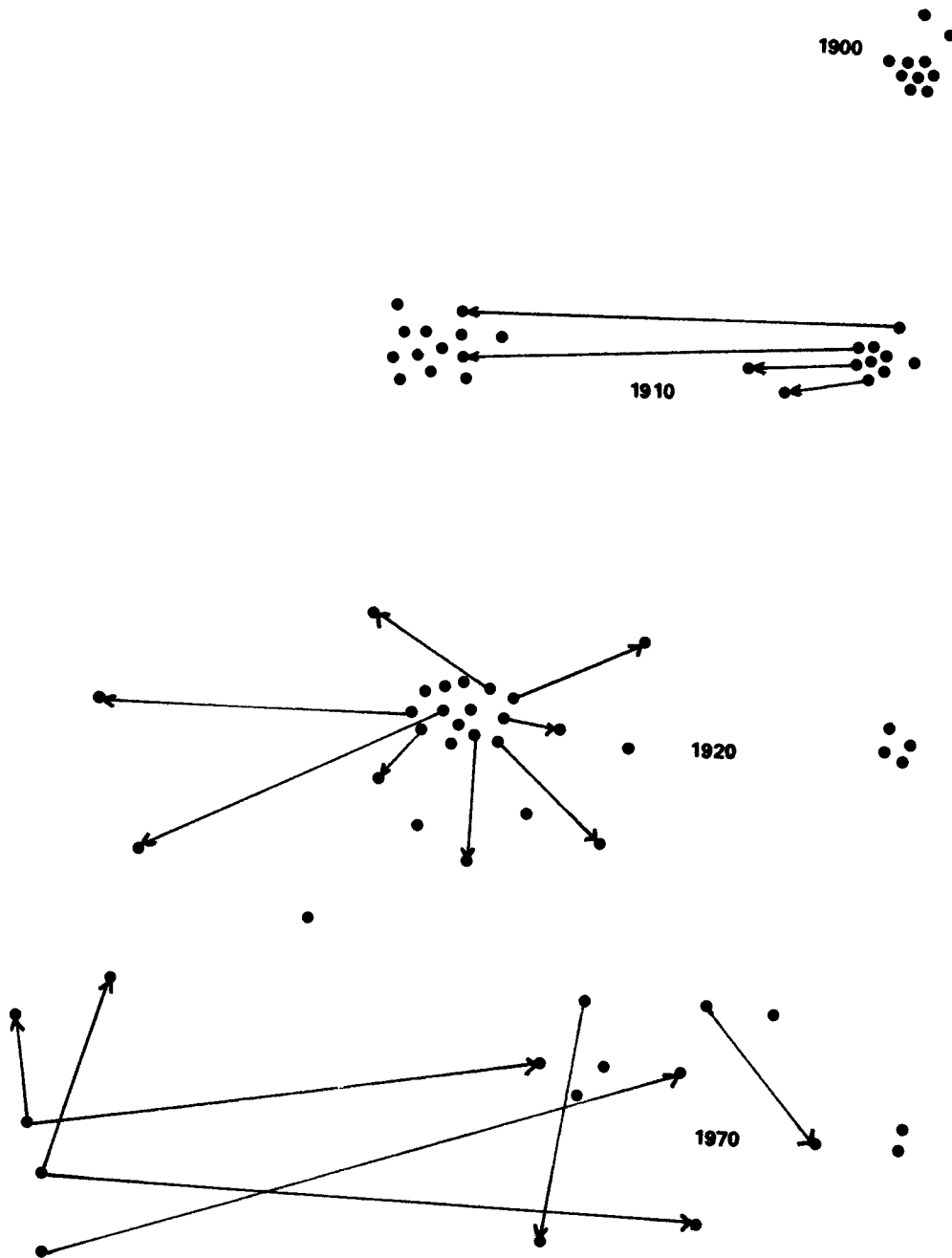


Figure 8

Diffusion of the Truck Industry

Source: See Footnote to Map 5

The electric and steam trucks, which were the most common ones in the early years, had certain disadvantages which prevented them from being used outside the cities. Because of their great weight and need to be recharged, they could operate only on the best surfaced roads, few of which were found outside the large cities or the older, well populated areas of the Northeast. The truck industry was thus faced with a barrier to acceptance, and it was forced to concentrate in the Northeast.

The spatial margin of profitability for companies also remained very small in the early years. If a new company wanted to enter the truck industry it was limited in its choice of location by the concentration of the only markets, parts suppliers and skilled labour, pools in the large cities of the Northeast. If the truck industry was to expand there would have to be significant changes in truck technology, levels of acceptance, and in road conditions.

The road situation was very slow to improve but there were some important changes in the design and production of trucks which in turn led to greater acceptance. As trucks improved they were able to operate in a wider range of operating conditions and were no longer forced to be used only in the cities with their good roads. With increasing markets outside the cities the truck industry was able to expand to other areas. (Fig. 8)

With the increasing acceptance of the gasoline engine, and thus the truck itself, the barrier to expansion was reduced considerably. With new markets opening up in rural areas there was an increase in the number of firms locating away from the large cities, where the market was in many cases already becoming saturated with too many firms. With the reduction of another barrier the industry was able to shift its concentration to another area of the country, the Midwest. (Fig. 8)

In the Midwest there were far fewer barriers facing the truck industry. The region already had a gasoline engine industry, parts suppliers, and markets. In addition there was greater availability of capital and entrepreneurs were quick to take advantage of such a situation.

As a result of these decreasing barriers the number of truck companies began to increase in number. They also began to locate increasingly in the Midwest and less in the traditional locations in the Northeast. Although the Northeast did retain some of its importance most of the new activity was in the new area.⁴ This period after 1910 was one in which the location choices for truck companies were greatly increased.

This was the period of greatest spatial expansion in the industry as truck companies were established in almost every populated part of North America. The main reason for this was another reduction in the barriers to expansion. Truck acceptance was increasing, the truck itself was improving in design, the economy was healthy, investors were easily available, and entry into the industry was very easy. As the ease of marketing, production, and financing increased so did the number of companies. In the 1910-1920 period there were few serious barriers to entry into the truck industry. As a result, truck companies were set up wherever there was a market, an entrepreneur, and a financier. In some cases only the entrepreneur was needed since the market or large amounts of financing were often not even considered.

Most of the new companies did, however, concentrate in the Midwest. Much of this was due to the fact that the region had many advantages which had been created partially by the tremendous growth of the automobile industry there, such as parts suppliers, labour, and markets. An additional reason was probably the influence of the bandwagon principle where companies tend to flock to an area where some other companies seemed to be having some success. (Fig. 8)

In this period of expansion, the spatial margin in which a company was most likely to be successful was increased tremendously. Up to about 1910 there were only a few small areas where truck companies could locate, but by 1920 this situation had changed considerably and truck companies were locating in all parts of North America.

As the level of acceptance increased and the truck itself improved, the job of selling the truck became much easier. In addition the task of actually building the truck also became much easier. Parts were readily available and it was a simple task to assemble the truck which was by 1920 being produced in a rather standardized form. Skilled labour was no longer as important a factor as it had been in earlier years. Capital requirements were low and capital itself was quite easily available. There were thus few restrictions on company locations and wherever there was a market trucks could be made and sold. As a result the spatial margin expanded to its greatest extent by 1920. Although it is difficult to actually measure how profitable some of the small isolated companies were the fact remains that truck firms were locating almost every area and most were successful for at least a few years during this period of expansion.

This trend toward expansion did not continue for long as the industry began to change again after 1918. Whereas the period up to 1918-1920 was one in which the barriers were greatly reduced, the one after was quite the opposite. (Fig. 8)

As the size of the truck market increased it soon reached a threshold level which made mass production economical.⁶ This attracted the large automobile companies, and they quickly gained large shares of the market, especially the light truck sector. With their mass production techniques and the fact that they were able to utilize certain economies of scale, they were able to produce trucks much cheaper than the small firms. It soon became evident that in order to survive, a truck company had to be large or specialize in large trucks. This had the effect of raising the barriers to entry into the industry. The great capital costs involved prevented many of the small companies from expanding to become more competitive. As a result they were forced to leave the industry. New firms were fewer since they could not overcome the increasingly large barriers to entry, and the number of companies began to decline, even though production increased.

With the number of companies decreasing, there was a contraction in the pattern of the industry. The companies that had located in the rural areas or in the rather marginal areas were forced to exit the industry. By the 1950's the industry was slightly concentrated in the Midwest but companies were also scattered throughout much of North America.

By the 1950's the industry seemed to have reached a state of maturity and few changes in the locational pattern were expected. The high cost of entry into the industry was a strong barrier and few new markets were being opened up for the existing truck companies. This, however, was not to be the case as changes in truck technology and spatial variations in operating conditions were to cause another diffusion of truck plants.

This was the development of the "Western" type of truck by the relatively new West coast companies. They had been developed to serve the special needs of the Western markets but they soon found new markets in the rest of the country. Resistance to the "Eastern" type of trucks had caused the new "Western" models to be built.

This situation could be compared to the gasoline truck being developed and improved to provide an alternative to the steam and electric trucks. Just as the gasoline truck moved away from the initial location of the industry so did the "Western" trucks. In this case the movement was to the East rather than the West as had been the case in the period after 1905.(Fig. 8)

As acceptance of the "Western" type of truck increased the barriers to entry were significantly reduced. The spatial margin in terms of marketing was made national and eventually assembly plants had to be established to serve the increased market.

The pattern of the industry in the 1970's is one which reflects maturity. The companies that have survived are well established in their present locations and are very unlikely to move or even expand to other areas. In a spatial context little activity is expected in the domestic truck industry in the near future.

Conclusion

The truck industry in North America is one which has experienced a number of significant changes through time. From its initial concentration in the Northeast, the focal point of activity shifted to the Midwest, then to the West coast, and finally back to the Midwest. During these spatial changes the industry experienced great fluctuations in the number of firms as it responded to economic conditions and other factors.

One of these other factors was truck type and it seems to have been the most influential in determining not only the spatial pattern of the industry but its structure and size as well. Truck type affected the level of acceptance and methods of production. These in turn caused changes in the roles played by other location factors such as raw materials and markets. As a result, as truck type changed so did the spatial pattern of the truck companies.

Another determinant of the industry's spatial pattern was the spatial margin in which firms could profitably locate. As truck type changed, the spatial margin also changed, either decreasing or increasing according to the barriers to expansion. Although chance or happenstance factors played important roles, it was still the spatial margin which ultimately determined the areal extent and size of the industry. At the present time this spatial margin is very large and has made the industry quite footloose. However, few changes are expected in the near future as high capital costs will tend to limit expansion and favour existing sites.

Footnotes for Chapter Seven

1. Few footnotes are used in this Chapter since most of the statements have already been referenced in the preceding chapters.
2. Hudson J.C., Geographical Diffusion Theory, Northwestern University, Studies in Geography, Evanston, Illinois, No.19, 1972, pg. 23
3. op.cit., pg.23
4. Haggett P., Geography: A Modern Synthesis, Harper and Row, New York, 1972, pg.345
5. Hudson J.C., op.cit., pg 21
6. Rhys D.G., The Motor Industry; An Economic Survey, Butterworth Co., London, 1972, pg.297

The labour intensive methods of production are acceptable for up to 5000 units per year. Beyond that level it becomes more economical to use mechanization. No firm would be justified in tooling up with special equipment at output levels of less than 20,000 per year.

Appendix A

Truck Production in the United States
1900-1976

Year	Number				
1900	100	1926	608,600	1951	1,426,800
1901	200	1927	464,700	1952	1,218,100
1902	300	1928	583,300	1953	1,206,200
1903	500	1929	881,900	1954	1,042,100
1904	700	1930	575,300	1955	1,248,100
1905	700	1931	432,200	1956	1,104,400
1906	800	1932	228,300	1957	1,107,100
1907	1,000	1933	329,200	1958	877,200
1908	1,500	1934	576,200	1959	1,137,300
1909	3,300	1935	697,300	1960	1,194,400
1910	6,000	1936	782,200	1961	1,133,800
1911	10,600	1937	891,000	1962	1,240,100
1912	22,000	1938	488,800	1963	1,462,700
1913	23,500	1939	700,300	1964	1,540,400
1914	24,900	1940	754,900	1965	1,751,800
1915	74,000	1941	1,060,000	1966	1,731,000
1916	92,100	1942	818,600	1967	1,539,400
1917	128,100	1943	699,600	1968	1,896,000
1918	227,200	1944	737,500	1969	1,923,100
1919	224,700	1945	655,600	1970	1,692,400
1920	321,700	1946	940,900	1971	2,053,000
1921	148,000	1947	1,239,400	1972	2,447,000
1922	269,900	1948	1,376,200	1973	2,980,000
1923	409,200	1949	1,134,100	1974	2,727,000
1924	416,600	1950	1,337,100	1975	2,272,000
1925	530,600			1976	2,993,000

Source: Statistical Abstract of the United States,
1970, pg. 716

Ward's Automobile Facts, 1938-1977

Appendix BNumber of Truck Companies, 1895-1977

1895	2	1923	222	1951	44
1896	2	1924	183	1952	42
1897	3	1925	170	1953	38
1898	5	1926	167	1954	38
1899	8	1927	162	1955	41
1900	22	1928	143	1956	39
1901	31	1929	127	1957	39
1902	33	1930	121	1958	40
1903	40	1931	109	1959	38
1904	41	1932	96	1960	39
1905	54	1933	86	1961	39
1906	67	1934	80	1962	40
1907	73	1935	74	1963	38
1908	80	1936	70	1964	38
1909	88	1937	66	1965	37
1910	138	1938	60	1966	37
1911	227	1939	56	1967	37
1912	280	1940	54	1968	35
1913	285	1941	53	1969	34
1914	269	1942	48	1970	34
1915	253	1943	41	1971	34
1916	248	1944	42	1972	34
1917	237	1945	46	1973	34
1918	237	1946	47	1974	33
1919	239	1947	49	1975	29
1920	259	1948	47	1976	28
1921	258	1949	46	1977	26
1922	246	1950	45		

Source: Automobile Quarterly, The American Car,
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